Scientific American.

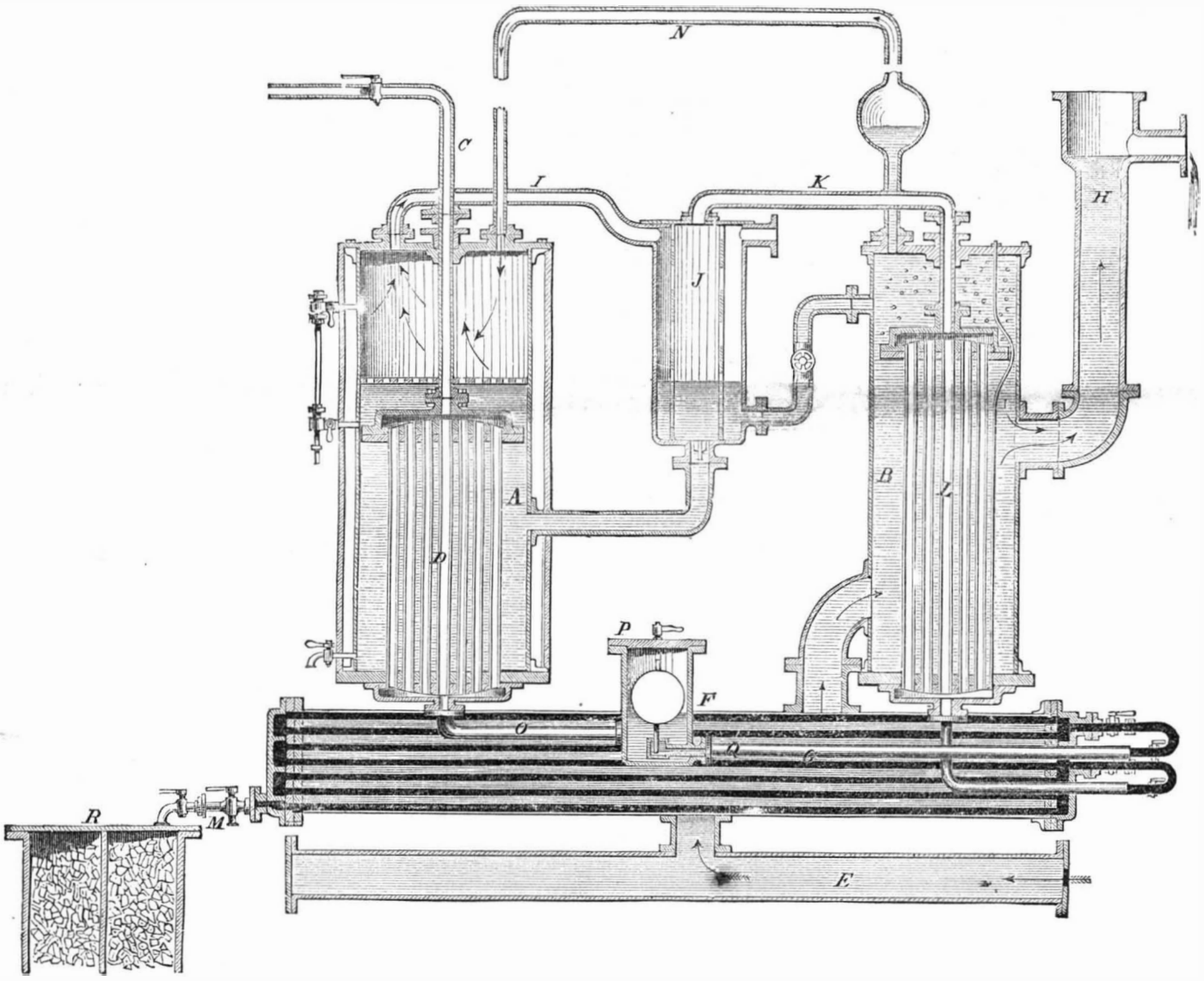
A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. II.—No. 17. NEW YORK, APRIL 21, 1860. NEW SERIES.

DR. NORMANDY'S IMPROVED FRESH WATER APPARATUS.

As pure and delicious a tumbler of water as we ever drank was recently taken from a quantity which had been pumped up a short time before from the dirty sea-water in the dock at the foot of Fulton-street, Brooklyn. It was distilled, aerated, and purified by the apparatus of Dr. Normandy. This apparatus has been in somewhat extensive use on board of English ships, and from the published testimonials it seems to be giving the most perfect satisfaction. These testimonials come from men of high positions, among whom are the staff surgeon and the director-general of the Army Medical Department at Suez, the commander of the royal mail steam-packet *Atrato*, the secretary of the Royal Mail Steam-packet Company, the secretary of the Government Emigration Board, the officers or owners of the vessels *Conway*, *Confiance*, *Plantagenet*, *Ellenborough*, *Morayshire*, *Forest Monarch*, *Schah Jehan*, *St. Croix*, *Devonshire*, and *Sphynx*, on all of which is has been tried. It has also been introduced into the British navy, and a commission of officers has been appointed to examine it with reference to its introduction into the navy of the United States.

Our readers who have examined the subject are aware that distilled water is the purest water known; but pure water is not adapted to the human stomach—it requires to be mixed with atmospheric air and carbonic acid. When distilled water is used at sea, it is customary to allow it to stand after it is distilled, exposed to the air a sufficient time to absorb a proper quantity to render it fit for drinking. The process of absorption may be hastened by pouring the water through the air from one tumbler to another for a considerable time. Dr. Normandy's plan is to bring the same gases which are expelled from the water in the process of distillation into contact with the steam before it is condensed, which absorbs them while it is in this expanded and divided state much more readily than when it is concentrated in the liquid form.



DR. NORMANDY'S IMPROVED FRESH WATER APPARATUS.

The annexed engraving represents a longitudinal section of the apparatus; A, being the evaporator and B, the condenser. The heat is supplied by steam coming through the pipe, C, and circulating through the series of pipes, D. The cold water is taken in through the large pipe, E, whence it passes in the direction of the arrows into the horizontal cylinder, F, around the cooling pipes, G, thence into the condenser, B, where, after furnishing a supply to the evaporator, through the pipes, S, and T, the waste is discharged through the waste pipe, H.

The water in the evaporator, A, is heated by the steam pipes, D, and evaporated into steam, which passes off through the pipe, I, into the priming box, J. The use of this priming box is to arrest any particles of salt which the steam may be carrying off mechanically. From the box, J, the steam passes through the pipe, K, into the series of pipes, L, where, being surrounded by the cold water in the cylinder, B, it is condensed and flows down into the series of pipes, G, which are surrounded by cold water directly from the ocean. After circulating through these pipes, the water flows out clean and cold at the pipe, M.

In order to impregnate the water with the air and gas which it originally contained, the air pipe, N, is led from the top of the condenser over into the top of the evaporator. When the water in the condenser, B, is heated by the steam in the pipes, L, to about 130°, the air and gases which it has absorbed begin to be driven off; and as they rise in the pipe, N, they are conducted over, and mixed with the steam in the upper part of the evaporator, A. Thus is the distilled water aerated.

Though the water in the evaporator, A, is of a higher temperature than 212°—or, at least, as high as this—it will still condense the steam in the pipes, D; for it is the property of steam to be condensed by water, no mat-

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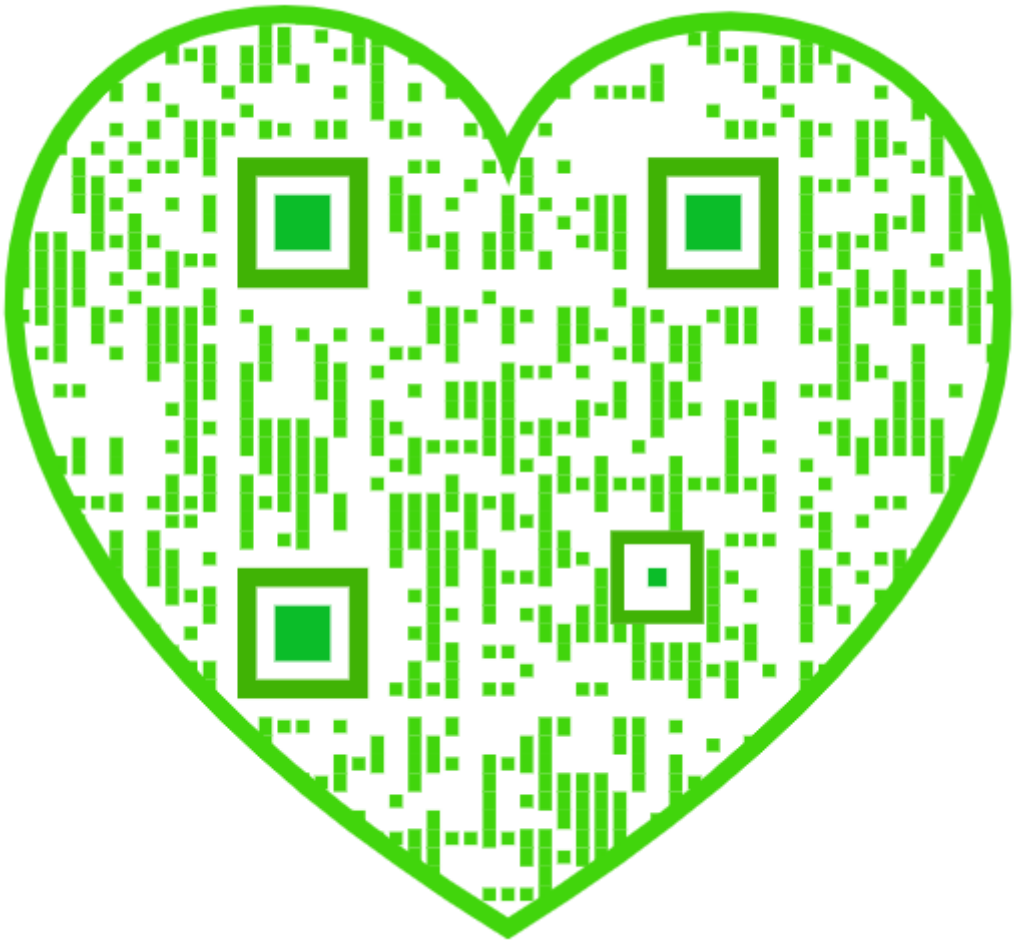

ter what the temperature of that water may be, provided it be lower than that of the steam which has to be condensed. This water, condensed from steam in the pipes, D, is, of course, clean distilled water, and may be used, provided it is mixed with the aerated water from the condenser, B. To this end, it is carried through the pipe, O, to the steam trap, P, which operates to draw it off just as fast as it is condensed, and no faster; whence it passes through the pipe, Q, and is turned into the series of pipes, G, where it mingles with the aerated water, and may be drawn off through the pipe, M.

Sea-water, besides the air and gases of which we have spoken, contains a quantity of volatile organic matter which begins to putrify and as soon as it is separated from the preserving salts by distillation, causes a very offensive odor. To get rid of this odor, the usual plan is adopted of filtering the water through charcoal. The filterer, R, is nearly divided by a diaphragm in the middle, which does not extend quite to the bottom, so that the water must pass down through one column of charcoal and up through another, and when it passes out, it is not only pure and sparkling, but perfectly sweet, being probably *better* water than most of our readers ever had the pleasure of drinking.

Whether or not this apparatus is more complicated than necessary, it produces as we have said, very perfect water, and it is coming into very general use in the navy and mercantile marine of Great Britain. It will no doubt result, as it ought to do, in a great fortune to its inventor. The American patent for this invention was granted to Dr. A. Normandy, a citizen of France, residing in London, England, on October 5, 1858; and persons desiring further information in relation to it will please address his agent, Theo. Lessey, at No. 30 Pine-street, this city.

RULE FOR MEASURING SHIPS.

The following is the legal rule for measuring ships in the United States. It will be seen that but two measures are taken for all large vessels—the breadth in one place and the length; and three for small ones. The English measurements are much more numerous; and, consequently, the actual size of the vessel is obtained much more accurately. From the different modes of measurement, it is impossible to make an accurate comparison of the tunnage of the two countries; as a general rule, we believe the American measurement gives a larger tunnage for the same ship than the British.

If the vessel be double-decked, the *length* is taken from the fore part of the main stem to the after part of the stern-post, above the upper deck; the *breadth*, at the broadest part above the main wales, half of which breadth is accounted the *depth*. From the length, *three-fifths* of the *breadth* is deducted; the remainder is multiplied by the *breadth*, and the product by the *depth*. The last product is divided by 95, and the quotient is deemed the true tunnage of such ship or vessel.

If the ship or vessel be single-decked, the *length* and *breadth* are taken as above for a double-decked vessel, and three-fifths of the breadth are deducted from the length. The depth of the hold is taken from the underside of the deck-plank to the ceiling in the hold. These are multiplied and divided as aforesaid, and the quotient is the tunnage.

The rule for what is called "carpenter's tunnage," is as follows:—For vessels with *one deck*, multiply the length by the breadth of the main beam, and the product by the depth. Divide this second product by 95. For *double-decked* vessels, take half the length of the main beam for the depth, and work as for a single-decked vessel.

THE SHIPPING OF THE BRITISH EMPIRE.

The following statistics of the shipping of the British empire are taken from the several numbers of the *Annual Register*, published in London. It embraces the shipping, not only of Great Britain and Ireland, but that of the British Possessions. For the year 1857, the shipping was distributed through the empire as follows:—

	Vessels.	Tunnage.	Men.
England	20,485	3,594,687	167,805
Scotland	3,508	639,557	32,135
Ireland	2,226	257,133	14,467
Isles of Guernsey, Jersey and Man	878	67,363	5,476
British Possessions	9,917	960,414	64,252
Total	37,014	5,519,154	284,135

In the second column of the next table, the total shipping of the empire is given, including the vessels propelled by steam; while in the columns to the right are the statistics of steam navigation of the United Kingdom since 1850:—

Years.	Total shipping.	No. of steam vessels.	Net steam tunnage.	Gross steam tonnage.
1820	2,648,593			
1830	2,531,819			
1831	2,581,964			
1832	2,618,068			
1833	2,634,577			
1834	2,715,100			
1835	2,783,761			
1836	2,664,177			
1837	2,651,655			
1838	2,739,073			
1839	2,899,144			
1840	3,311,538			
1841	3,512,490			
1842	3,619,850			
1843	3,588,387			
1844	3,637,231			
1845	3,714,061			
1846	3,817,112			
1847	3,952,524			
1848	4,052,160			
1849	4,144,115			
1850	4,232,962	1,181	167,398	
1851	4,332,085	1,218	185,366	
1852	4,424,392	1,263	207,989	
1853	4,764,422	1,375	248,623	
1854	5,115,846	1,513	304,559	
1855	5,250,553	1,664	379,020	
1856	5,312,436	1,687	385,038	
1857	5,519,154	1,813	416,132	671,503
1858	———	1,916	451,047	682,433

The facts in regard to the steam shipping are taken from *Mitchell's Steam-shipping Journal* (published in London), for January 6, 1860.

SHIPPING OF THE UNITED STATES.

The following table of the shipping belonging to the United States, in each year from 1815 to 1859, inclusive, is compiled from the *American Almanac* and the reports of the Secretary of the Treasury:—

Years.	Total Tunnage.	Tunnage in Steam navigation.
1815	1,368,127	
1816	1,372,217	
1817	1,399,910	
1818	1,225,183	
1819	1,260,751	
1820	1,280,165	
1821	1,298,958	
1822	1,324,698	
1823	1,339,564	24,879
1824	1,394,562	21,609
1825	1,423,110	23,061
1826	1,534,190	34,058
1827	1,620,607	40,197
1828	1,741,391	39,418
1829	1,360,796	54,036
1830	1,191,986	64,471
1831	1,367,845	34,435
1832	1,459,449	90,813
1833	1,606,149	101,849
1834	1,758,906	122,815
1835	1,824,939	122,815
1836	1,882,095	145,556
1837	1,896,685	154,764
1838	1,995,638	193,413
1839	2,096,478	204,938
1840	2,180,763	201,339
1841	2,030,743	175,088
1842	2,092,389	229,661
1843	2,158,512	236,867
1844	2,280,094	273,179
1845	2,417,001	326,018
1846	2,562,084	347,893
1847	2,839,044	404,841
1848	3,154,041	427,891
1849	3,334,014	462,394
1850	3,535,454	525,946
1851	3,772,439	583,607
1852	4,138,440	643,240
1853	4,407,010	514,094
1854	4,802,902	676,607
1855	5,212,000	770,286
1856	4,871,651	673,077
1857	4,940,843	705,784
1858	5,049,807	720,390
1859	5,145,087	———

SIZE AND POPULATION OF THE PRINCIPAL COUNTRIES.

The following table of the size and population of the principle countries of the world we take from *Mitchell's Atlas* of 1853, most of the censuses having been taken in 1850:—

Countries.	Area in sq. miles.	Total population.
Russian Empire	7,906,397	65,331,568
British Empire	7,568,821	161,501,034
Chinese Empire	5,200,000	230,000,000
Austrian Empire	257,830	37,383,456
United States	2,963,460	23,363,327
France	202,125	35,400,486
Spain	176,480	15,712,500
Prussia	106,302	16,346,625

AREA AND POPULATION OF THE BRITISH EMPIRE IN DETAIL.

	Area in sq. miles.	Population.
Great Britain and Ireland	118,948	27,619,866
Ionian Isles, Gibralter, &c.	1,192	354,797
British North America	2,816,760	2,290,363
West Indies and colonies in Guiana	90,445	930,430
Cape Colony, Natal, &c.	130,000	420,936
British India	1,143,812	127,778,981
Ceylon	24,664	1,421,661
Australian Colonies and New Zeal'd	3,243,000	685,000
Total	7,568,821	161,501,034

AMERICAN BASKET WILLOW.

MESSRS. EDITORS:—A short article on page 152 of the present volume of the SCIENTIFIC AMERICAN suggests the following communication in reference to the growing and peeling of basket willows, which is a subject of no small importance, although but little understood in this country. Probably nine-tenths of the willows used here are imported; and until within a few years, very little attention was given to their cultivation; but enough has now been done to prove that they can be grown and peeled in sufficient quantity to supply our own market at a price much below what they now command.

The cultivation of willows is very simple; the land must be rich and moist, but not too wet; it is prepared by deep plowing and harrowing, and the cuttings or "setts" (which are pieces of willows of the last year's growth cut nine inches long) are stuck in rows three feet by one, and cultivated during the first year as you would a choice piece of corn. After the first year, once hoeing in May or June is all the attention they need. The time of cutting and peeling varies with the latitude of the place, and there are three different times and ways in which they can be peeled. The plan which is much practiced in England, but very little in this country, is to let them stand without cutting through the winter and until the bark will slip in May or June, and then cut and peel at the same time. The objection to this plan is that it injures the plantation and puts back the next crop to cut them so late in the season, and it also makes the season for peeling very short, as there will be but three or four weeks after the bark will start before they will be so much grown as to be unfit for peeling. Another plan which is practiced to some extent in this country is to cut them at any convenient time after the leaves fall, and boil them until the bark will slip. The objections to this plan are, first, the expense of boiling, which is considerable if there is a large quantity to be peeled; and, second, it spoils the willows for market, as the boiling causes them to turn red or brown. The third plan, and the one which I have proved by experience to be the most feasible and profitable, is to cut the willows in the Fall, as soon as the leaves are off, bind them in convenient bundles and pile them up in the field; then let them lie until the occurrence of a fall of snow, sufficient to go on with sleighs and haul them off to a piece of ground which I have graded and graveled for the purpose, and around which I have raised an embankment, so that it can be flooded to the depth of one foot. On this level ground I set the bundles as thick as they can stand, each bundle standing in a perpendicular position. As soon as it thaws in the Spring, I turn on the water so as to flood the ground to about six or eight inches depth, and keep it so flooded until the willows are peeled. They will put out leaves and the bark will start in this pond as well as if they were in the field uncut, and they will remain in a condition to peel much longer. In the northern States peeling may be commenced in the fore part of May and continue until July if necessary. Treated in this way the willow whiten much better than by either of the other processes, and, of course, command a better price in market. Formerly, all willows (and at present a very large part that are used) are peeled by hand, one at a time; but machinery has been perfected, and is being rapidly introduced, to do this work much faster and cheaper than it can be done by hand.

I would not advise any one to start a willow plantation until they have visited one that is in successful operation and learned all the little matters that cannot be shown in writing. When this is done and a plantation started in the right manner, there is no more sure crop, nor one that will pay a better profit. Two tuns of peeled willows to the acre is no more than a fair average yield, and they will sell for $100 per tun; which the cost of cultivating and peeling, including interest on capital employed, will vary from one to two cents per lb., according to the place, the price of labor and the conveniences for getting water and power to drive the machinery. GEORGE J. COLBY.

Waterbury, Vt., April 14, 1860.

VELOCITY OF THE CURRENT IN RIVERS.—In a note supplementary to the series of articles on river navigation, written by Mr. Joseph W. Sprague, of Rochester, N. Y. (which have attracted general attention among our readers), the author states that generally speaking, the velocity of the water in the center of a river, or where the channel is deepest, is more rapid than at the sides where the water is shallow. The velocity of the surface water is also greater than that of the water underneath it; the velocity decreasing from the surface to the bottom. When, however, the water-way is obstructed so as to produce back-water, as by the piers of a bridge, the case is entirely changed; then the surface velocity, instead of being greatest, is least; the velocity increasing from the upper level of the *remou*, or back-water, to the lower level, where it becomes a maximum; and thence diminishing towards the bottom. In estimating the velocity of the current in a "draw," heed should be given to this change in the location of maximum velocity, or else too small a value will be arrived at.

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JOURNAL OF PATENT LAW.

THE INFRINGEMENT OF PATENT RIGHTS—RULE OF DAMAGES.

It is one thing to secure the issuing of Letters Patent, by the Patent Office at Washington; it is another thing to secure a patent that will stand the test of innumerable lawsuits which, if the patent is valuable, it is sure to occasion; and it is still another thing, when the patent is properly issued, and the patentee is assured that the sharpest legal needle ever invented cannot penetrate it—when it is supposed to be capable of withstanding both the assaults of learned counsel and of courts—to apprehend and apply the legal remedy to an infringement of it. It may be of interest to patentees to know what are their remedies when the exclusive right to their invention is unscrupulously invaded by men who allow no rights of others, however sacred they may be, to stand in the way of their realizing wealth. There is probably no individual ownership of property founded upon considerations so just as the ownership of patent rights. The ownership of personal and real property are both founded upon principles of public policy. At first, men possessed all things in common. Gradually, articles of personal use, as clothing, weapons of personal defence, &c., came to be considered as attached to and finally *belonging* to the individual possessor of them. This, in process of time, has given rise to what is now considered, and protected by law, as personal or chattel property. The ownership of real estate originated still later in the annals of mankind. Men were first hunters and shepherds, not farmers; and the reason and purposes to be gained by individual ownership of land were neither understood nor appreciated. Indeed, in a society of hunters, individual ownership of portions of the common territory would be more of a detriment than an advantage to the community.

The individual ownership of patent rights is founded upon principles of public policy, but not upon these alone; there is a justness in giving to a man the natural product of his own inventive faculties. If an inventor brings into the world that which previously did not exist in it, then, surely, no one can have so good a right to the application and disposal of it as the inventor himself. It is optional with him to invent or to allow his faculties to remain untaxed by inventive exertion. The law has recognized this right of inventors to the products of their own genius, and has protected it by imposing upon the violator of a right the payment of a sum of money, as damages, to the injured party, equal in amount to the sum which the infringer actually realizes in profits. It will not estimate the damages by what the infringer might have made if he had used reasonable diligence; but will simply oblige the infringer to pay *all* his profits to the rightful owner of them—the patentee.

The case of Mason and others *versus* Dean, recently decided in the United States Supreme Court, is an authority upon the above point. The plaintiffs claimed to be the owners of a territorial right to the exclusive use of the Woodworth patent for planing boards, and charged the defendant with using three of the machines in the city of Providence, R. I. It appeared that the original term of the patent had expired, and that a second extension of the term had been granted by Congress. During the first term of the extension of the patent, the defendant had been licensed by the owners of the patent to use the machines, which they now sought to enjoin the defendant from using. The facts of the case were not disputed; consequently, there was no issue to be tried by a jury, and a decree, perpetually enjoining the defendant from using the machines in question, was entered by confession. Damages were awarded to the plaintiffs; but in computing their amount, the master was governed in his estimate by the amount of profits which the defendant might, *by reasonable diligence*, have derived from the use made by him of such patented machines. To this basis of estimating the amount of damages the defendant excepted, and sought redress by appealing the case from the Circuit Court for the district of Rhode Island to the Supreme Court. So far as affecting the question of damages in the case, we give the opinion of the court deciding the appeal.

McLean, J.—"This is an appeal from the Circuit Court of Rhode Island. A bill was filed in this case by Mason and others, claiming to be owners of a territorial right to the exclusive use of the Woodworth patent for planing boards, charging the defendant with using three of the machines in the city of Providence, in violation of the complainants' right. The suit was commenced the first year of the extension of that patent by Congress; and the three machines which were sought to be enjoined were those used during the first extended term of the patent, under a license from its owners. A preliminary injunction was granted.

"At the June term, 1851, of the Circuit Court, a decree, *pro confesso*, was entered against the defendant, and he was perpetually enjoined. The case was referred to a master, to take an account of the profits or income derived by the defendant, or which, by reasonable diligence, might have been realized by him, from the use made of the three machines. Exceptions were taken to the first report of the master, and it was referred to him again under the same instructions. Before the second report of the master, a motion was submitted to the court by the defendant to set aside the decree *pro confesso*, and for leave to answer the bill, on the ground that the Supreme Court had held, in a case similar to this, that the licensee's privilege continued, under the extension of the patent by Congress, the same as under prior extensions; but the court refused the motion, consequently the appeal does not bring before us any question under the last extension of the patent.

"At the November term, 1854, the master made his second and final report, in which he stated the sum of $2,561 46 as the amount of profits which the defendant, by reasonable diligence, might have derived from the use made by him of such patented machines, and the sale of the products thereof, during the period covered by the suit. The decree was entered, on the report of the master, for the estimated amount of profits which the defendant, with reasonable diligence, might have realized; not what, in fact, he did realize. This instruction was erroneous. The rule in such a case is the amount of profits received by the unlawful use of the machines, as this, in general, is the damage done to the owner of the patent. It takes away the motive of the infringer of patent rights, by requiring him to pay the profits of his labor to the owner of the patent. Generally, this is sufficient to protect the rights of the owners; but where the wrong has been done under aggravated circumstances, the court has the power, under the statute, to punish it adequately by an increase of the damages. The injury done is measured by the supply of planed boards thrown upon the market, which lessens so much the demand. But if the liability of an infringer is to be increased by an estimate of the work he *might* do, with great diligence, he will be more likely to exceed the estimate than fall below it. This policy would increase the evil of the wrong-doer without benefit to any one. For the reasons assigned the decree for damages must be reversed, at the cost of the defendants in error, as founded on an erroneous estimate, and the cause is remanded to the Circuit Court, with instructions to enter a decree for the amount of the profits actually realized by the defendant from the wrongful use of the patent."

STEEL WIRE FOR TELEGRAPHS.

The following letter from one of the most extensive wire-manufacturing firms in the country will doubtless interest many of our readers besides the one for whom the information was obtained:—

MESSRS. EDITORS:—In reply to your inquiries about the power of tension of 3-16ths iron wire, we would say that "No. 6½" (which is 3-16ths gage, made of the best American iron, and drawn once after annealing) will sustain a weight of 2,300 lbs. before it yields. To find how much 80 lengths of 40 feet will hold up, it is only necessary to take two lengths and put them side by side, suspended between the walls of a 40-feet room; then load them at such points as desired and multiply the desired number of wires by the weight thus obtained. We think that *steel* wire of the same size would sustain twice that amount. We believe that steel wire will soon be substituted for iron wire for telegraphic purposes. It is found to be a much better conductor and very much stronger. We learn that it is now used in England for that purpose.

Our price for galvanized wire, made of the best American charcoal iron (any number from "6½" to "10," and put up in coils of ½ mile) is 9 cents per pound; but most of the telegraph wire which we make is of much less a price. WASHBURN & MOORE.

Worcester, Mass., April 9, 1860.

LINSEED OILS.

MESSRS. EDITORS:—On page 201 of the present volume of the SCIENTIFIC AMERICAN, appeared an article on the above subject, in which you informed your readers that the annual importation of foreign oil amounts to above 250,000 gallons, valued at $164,700. You also state that you have been unable to ascertain the quantity manufactured at home from native grown seed. I apprehend that the latter is so small as to be of little consequence; that is, when the enormous quantity of foreign seed crushed in this country is taken into consideration; and it is in relation to the latter that I now desire to give you some information, for the benefit of those readers whom it may interest.

The imports of linseed into the United States for the year 1859 (almost entirely from India) were 2,348,777 bushels. This yielded 5,000,000 gallons of oil, valued at 56 cents per gallon = $2,800,000; and 41,400 tuns of cake at $32 = $1,324,800: total, $4,124,800. The seed cost, at $1 50 per bushel, $3,523,165, which, deducted from the above, leaves $601,635 for the cost and profit of manufacturing.

You will observe by the above figures that, as you well remarked in your previous article, it "forms a staple business." Moreover, we can well afford to pay England the paltry sum of $164,700 for oil which we want, when she is so good as to give $1,324,800 for oil cake which we do *not* want, besides paying our shipowners' freight on the 41,400 tuns. The question now suggests itself whether or not it would be more for the interest of the country to raise our own linseed. Now, provisions and breadstuffs go to pay for it. Farmers can figure for themselves. The price named above ($1 50 per 52 lbs.), though taken as a basis for last year's business, is below the average. Perhaps $1 70 would be nearer the mark. Certainly, when we consider the many uses to which the fiber of the plant itself may be applied, it does seem that the culture of flax ought to be profitable. W. S. T.

Boston, Mass., April 16, 1860.

THE FORCE OF A RE-ISSUED PATENT.

MESSRS. EDITORS:—I take the liberty of troubling you with the following question:—A obtains a patent on a machine, but fails in his claim to cover *all* its peculiarities or all the characteristics of his invention. Subsequently, B, C, D, &c., obtain each a patent on the same machine, but are obliged to use those characteristics of A's invention, which are *not claimed* by A. Now, can A, by a re-issue or other document, prevent B, C, D, &c., using such unclaimed characteristics? F. G. W.

Worcester, Mass., April 10, 1860.

[The object of a re-issue, in many instances, is to meet just such a case as you set forth. Under a re-issue of his patent, A is entitled to claim all that was new in his model at the time he first made his application for the patent; he would hold it in spite of Letters Patent to a subsequent party, who would also be regarded in law as an infringer of the re-issued patent.—EDS.

AN IMPROVED FISHING ROD WANTED.

MESSRS. EDITORS:—Allow me, through the medium of your valuable paper, to suggest to manufacturers of rubber goods a new article of manufacture (new at least to me), namely, a fishing rod. To secure a good fishing rod, it must be made in joints about four feet long, and be hollow for its entire length, both to secure lightness, and to make a case for the line to pass from the reel to the end of the pole. If the line is placed within this case or hollow rod it cannot be caught by bush or briar, as is the case when the line passes through thimbles or rings on the outside of the rod. For the same reason the reel should be encased in a swell in the butt of the rod. It is possible that rods of this kind are now made; if so, any manufacturer who will advertise such a rod (through the SCIENTIFIC AMERICAN) will find many purchasers in my neighborhood.

A good trout rod should be 20 feet long, and not over 3-16ths of an inch in diameter at the tip. O. W. S.

Plantsville, Conn., April 9, 1860.

INTERESTING TO POMOLOGISTS.—Mr. Dubreil, the eminent French pomologist, states that he has produced much larger fruits than usual by moistening the surface of the green fruit with a solution of sulphate of iron, 24 grains to a quart of water. This was done when the fruit first set, when it was half, and when it was three-quarters grown, taking care never to do it when the sun was shining. It has long been well known that this solution greatly stimulated absorption.

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FIRE-ESCAPE HOOK AND LADDER TRUCK.

This is the first of the series of inventions brought out by the existing excitement in regard to fire-escapes. It consists of a number of improvements in the ladder and in the truck, which have been amply secured by two patents—one on the truck and the other on the ladder.

The truck is made of the usual form with the exception of two important modifications. One of these is in the attachment of the perch to the carriage, and the other in the mode of securing the wheels from turning. The perch is attached to the carriage by means of a bolt dropping down perpendicularly from above through the holes, *a*, in the perch and carriage, thus allowing the perch to be readily removed when the ground for operations is reached. For preventing the wheels from turning, a socket is made in th hub and a ring is secured to one of the spokes by means of a band passing around the spoke loosely so that it will slip from the hub to the felloe, it being held in any position by means of a set screw. This ring being drawn outward to the end of the spoke, the crowbar is passed through it and into the socket in the hub, when, the larger end of the crowbar being turned down upon the ground, the wheel is effectually prevented from rolling farther in the operation of raising the ladder.

There are several novel features in the extension ladder. It consists of either two or three separate ladders, which are so constructed that they may be at once connected for extension or they may be used singly if occasion requires. When it is desired to raise the ladder, two chains or wire ropes, *b*, which pass through pulleys on its end, are secured at one end to the bottom of the wheels and at the other to the windlass *d*, which being turned by means of the cranks upon its ends, the ladder is tilted up, its rest upon the front carriage of the truck acting as a fulcrum. At the same time, the "tormentors," C C, are carried out by assistants, and set to support the ladders in the position required. When the ladder is raised at the desired angle it stands 40 feet in hight, but may be extended to 80 or 100 feet if desired. For the purpose of a shorter extension of 70 feet, the additional ladder, E, is secured to the main ladder by means of a metallic slide, which passes under a metallic lip on the main ladder. A chain is fastened to the ladder, E, near its lower end; and, passing over a pulley on the upper round of the main ladder, is brought down to the windlass, *d*, the chain or wire ropes used in raising the ladder being disconnected for this operation. The third ladder, F, is extended by a similar contrivance over the second; the windlass, *d*, being made in two parts, upon one of which is wound the chain rope for extending the second ladder, and on the other the one for extending the third.

After the ladders are extended they may be held in place each by an iron S-hook, and the chain ropes and windlass released for other uses, such as raising the hose or sending up a fireman in a wire basket, who may swing himself into the several windows of a building to seek and rescue the inmates.

It will be seen that this apparatus is light, simple and efficacious. While it answers all the purposes of the present fire-ladders and trucks in a far more complete and convenient manner, it is at the same time a most efficient fire-escape. The trucks now in use can readily be adapted to this ladder by a slight modification, and we are told that it has met the approval of almost all the firemen who have examined it. We commend it to the thorough examination of the authorities of our Fire Department, and especially to the gentlemen who have thought it necessary to send to England for a fire-escape, as represented on page 244 of the present volume of the SCIENTIFIC AMERICAN.

The inventors of this apparatus are G. B. Mickle and J. M. Carville, of this city. They are practical firemen, long connected with our Fire Department.

The patents for this invention were secured through the Scientific American Patent Agency, April 10, 1860, and the claims will be found on another page. Persons desiring further information in relation to it will please address G. B. Mickle, care of A. H. Mickle & Sons, No. 36 Broadway, this city.

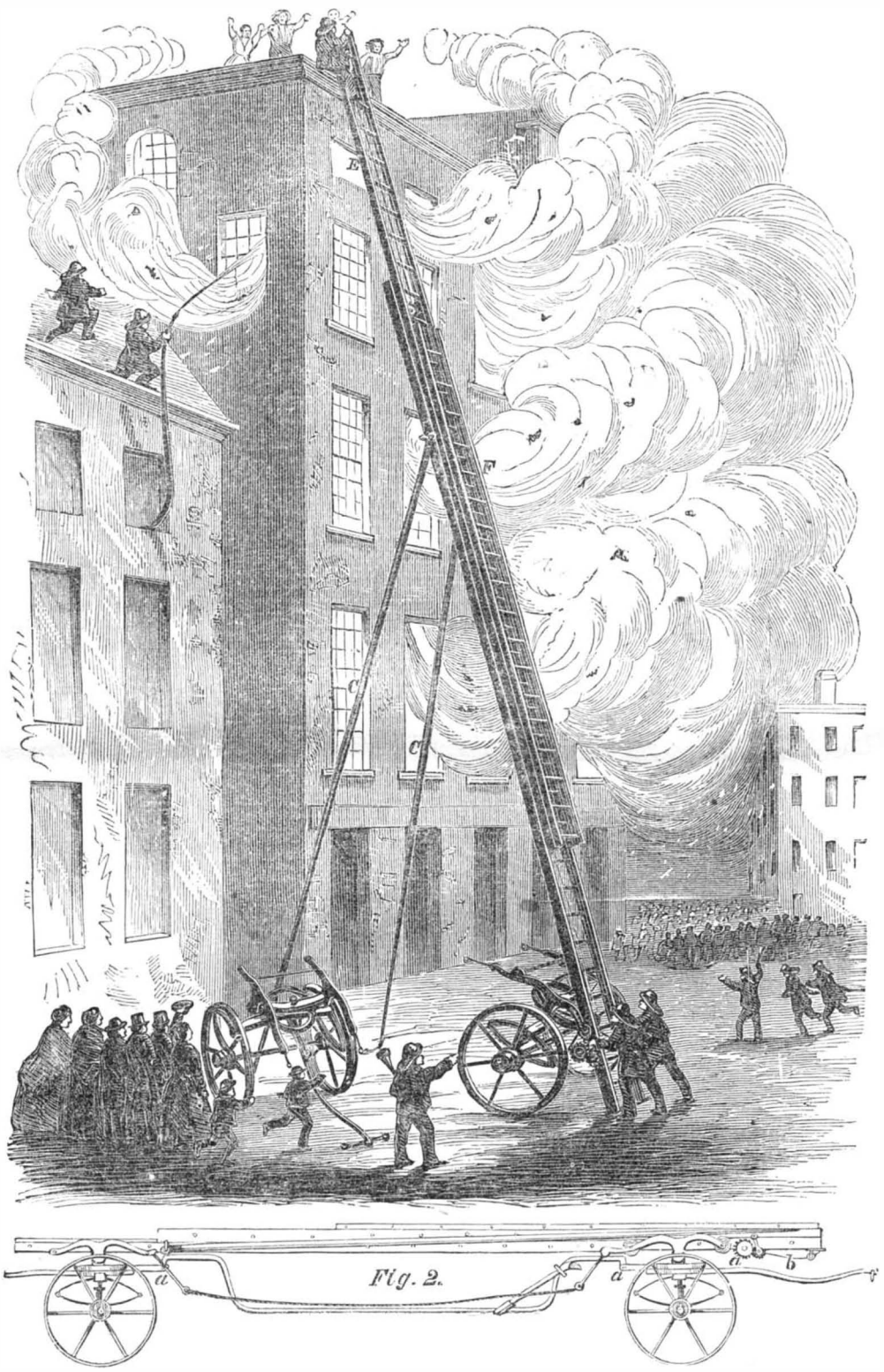

Fig. 2.

MICKLE & CARVILLE'S FIRE-ESCAPE HOOK AND LADDER TRUCK.

THE JAPANESE STEAMER.

The Japanese steam corvette, *Candinmarruh*, arrived at San Francisco on March 17th, 37 days from Jeddo. This corvette is the first native vessel ever permitted to leave the shores of Japan. It brings the information that the Japanese embassy was to leave for the United States, on the *Powhattan*, on February 11th.

The corvette is 250 tuns burthen, carries 10 guns, and her crew consists of 57 men. The people of San Francisco are delighted with the arrival of the Japanese, and are doing everything in their power to entertain their visitors, hoping thereby to stimulate the lucrative trade already commenced with Japan.

A San Francisco writer, who visited the vessel, says: "The *Candinmarruh* sails pretty well, having made about 200 miles in one day. She was built in Holland for the Japanese emperor, and was sent out in her present condition about three years ago. She cost $70,000. This is one of several steamers composing the Japanese navy. She is the first one that has left the country for a foreign port. The Japanese sailors are *au fait* in all the usual work pertaining to the duties of a seafaring life. The boatswain is as thoroughly up in his work as any man could be in any service. There is no kind of sailor work that he does not thoroughly understand, and can also manage his men in a ship-shape manner. The crew run aloft and take in sail with the utmost alacrity. There were no punishments of any kind inflicted on the crew; everything going pleasantly and easily from the first. The government on board is mild and humane. The science of navigation is thoroughly understood among the officers, who learned it from the Dutch at the school of Nagasaki. We were received at the gangway by a marine wearing the uniform of the Japanese navy, viz: dark worsted material, consisting of frock and trowsers, with wooden sandals. Stepping upon the spar deck, we were at once struck with the neatness and order which everywhere reigned. The marines have a large square patch between their shoulders, upon which their peculiar rank is written in Japanese characters. We were introduced to the admiral. He is a benign, benevolent looking man, about 40 years of age. When we entered he was having his hair most artistically dressed with oils and pomatum, by one of his servants. Soon after, he appeared on deck, dressed in an unassuming but gentlemanly costume. At his side hung two swords, resembling ataghans. The officers on board a Japanese ship, from lieutenant up, are called 'two-sword officers,' and entitled by rank to wear two swords. These weapons are keenly sharp-pointed, and beautifully polished. We noticed in the admiral's cabin a picture of President Buchanan. The Japanese national flag is displayed on board the ship at the mainmast and in the bows. This is a white groundwork with a red ball in the center. The admiral's flag floats from the mizen."

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COOKING BY THE SUN'S RAYS.

BY PROFESSOR JOSEPH HENRY.

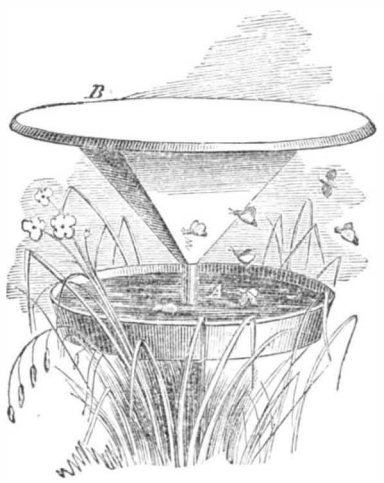
Were it not for the aerial envelope which surrounds our earth, all parts of its surface would probably become as cold as night, by radiation into space, as the polar regions are during six months' absence of the sun. The mode in which the atmosphere retains the heat and increases the temperature of the earth's surface may be illustrated by an experiment originally made by Saussure. This physicist lined a cubical wooden box with blackened cork, and, after placing within it a thermometer, closely covered it with a top of two panes of glass, separated from each other by a thin stratum of air. When this box was exposed to the perpendicular rays of the sun, the thermometer indicated a temperature within the box above that of boiling water. The same experiment was repeated at the Cape of Good Hope, by Sir John Herschel, with a similar result, which was rendered, however, more impressive by employing the heat thus accumulated in cooking the viands of a festive dinner. The explanation of the result thus produced is not difficult, when we understand that a body heated to different degrees of intensity gives off rays of different quality. Thus, if an iron ball be suspended in free space, and heated to the temperature of boiling water, it emits rays of dark heat, of little penetrating power, which are entirely intercepted by glass. As the body is heated to a higher degree, the penetrating power of the rays increases, and, finally, when the temperature of the ball reaches that of a glowing or white heat, it emits rays which readily penetrate glass and other transparent substances. The heat which comes from the sun, consists principally of rays of high intensity and great penetrating power. They readily pass through glass, are absorbed by the blackened surface of the cork, and as this substance is a bad conductor of heat, its temperature is soon elevated, and it in turn radiates heat; but the rays which it gives off are of a different character from those which it receives. They are non-luminous, and have little penetrating power; they cannot pass through the glass, and are retained within the box, and thus give rise to the accumulation of the heat, The limit of the increase of temperature will be attained when the radiation from the cork is of such an intensity that it can pass through the glass, and the cooling from this source becomes just equal to the heating from the sun. The atmosphere which surrounds the earth produces a similar effect. It transmits the rays from the sun, and heats the earth beneath, which in its turn emits rays that do not readily penetrate the air, but give rise to an accumulation of heat at the surface. The resistance of the transmission of heat of low intensity depends upon the quantity of vapor contained in the atmosphere, and perhaps also on the density of the air. The radiation of the earth, therefore, differs very much on different nights and in different localities. In very dry places as, for example, in the African deserts and our own western plains, the heat of the day is excessive, and the night commensurably cool. Colonel Emory states, in his Report of the Mexican Boundary Survey, that, in some cases, on the arid plains, there was a difference of 60° between the temperature of the day and that of the night. Indeed, the air is so permeable to heat, even of low intensities, in this region, that a very remarkable difference was observed on some occasions when the camp-ground was chosen in a gorge between two steep hills. The inter-radiation between the hills prevented in a measure the usual diminution of temperature, and the thermometer in such a situation stood several degrees higher than on the open plain.

INSECT AND VERMIN-EXTERMINATING POWDERS.—The various-termed insect and vermin-exterminating powders (Persian, Lyons', &c.) now in general use, are composed essentially of the same material, which has long been known to the Trans-Caucasian populations under the name of "Guirila." In that paradise of vermin it is an article of a very considerable commerce, and is not only carried inland through Russia in large quantities, but is also exported to Germany and France. A large depot exists at Vienna. It is a coarsely-ground powder, of a green color and penetrating odor, formed of the flowers of the *pyrethrum*, *carneum* and *roseum*, which grow in the Trans-Caucasus at a hight of 5,000 or 6,000 feet. This powder possesses the peculiarity of rapidly destroying the insects, which soon afterward die. Strewed about the room or the bed it proves a poison to fleas, lice, flies, &c. In the military hospitals in hot countries, it is an invaluable preventive of the formation of maggots in wounds, and the more so inasmuch as its use is attended with no disadvantages, unless employed in large quantities in closed bedrooms, when it may give rise to confusion in the head, such as is produced by flowers or new hay. It has long been used as a means of preserving insects, and cannot be too strongly recommended to those who have the care of herbarian and other natural history collections liable to the depredations of insects. Unfortunately, the demand for the powder has been so great of late as to lead to its adulteration by the addition of the stalks and leaves of the plants to the flowers, and to the mixing of the new with stale powder. As a general rule the powder purchasable in Germany is very different from the Asiatic in color, smell and efficiency.

HEARD'S MOTH TRAP.

The damage annually done by insects, either in the larva or perfect state, is to be reckoned in millions of dollars. There is hardly one of our agricultural products which is free from their attacks. A considerable portion of our cotton, tobacco, wheat, rye, corn, barley, and oats, is consumed by these small but numerous devourers. They eat up our honey, destroy our plums and cherries, make our pippins knotty and wormy, and finally, crawling into the inmost recesses of our closets and bureaus, make their dainty repasts upon our costly furs and broadcloths. It is known that insects, in the course of their wonderful growth, pass through three conditions, which are as totally unlike each other as it is possible to conceive. When first hatched from the egg they exist as simple worms, in which state they grow to their full size, and then pass into that strange mummy condition called the chrysalis. In this state, generally wrapped closely in a coccoon or other envelope, they silently and blindly pass through that mysterious metamorphosis which changes them into the perfect winged insect, when they fly away among the flowers, full of changing and joyous life. It is in their loathsome larva state that they are most destructive, but it is when they have been changed to perfect winged moths, and are about to become the parents of innumerable offspring, that they are most easily and most effectually destroyed. The pretty picture annexed represents an ingenious device for luring these little pests to their destruction.

It consists simply of a broad shallow pan or cup, A, to be filled with molasses, and a broader cover, B, to protect it from the sun and rain. A little anise, fennel, or other essential oil, should be mixed with the molasses,



to attract the moth; and a little phosphorus paste may be rubbed on the sides of the inverted pyramid which supports the cover to decoy the insects in the evening. The whole trap is made of tin, and should be placed on small stakes at a suitable hight in the garden or grounds,

The patent for this simple and probably valuable invention was procured, through the Scientific American Patent Agency, February 7, 1860, and persons desiring further information in relation to it will please address the inventor, Dr. Joseph M. Heard, at Prairie Station, Miss.

HISTORICAL SOCIETY IN NEW MEXICO.

MESSRS. EDITORS:—An historical society was organized here on the 26th of December; Col. J. B. Grayson was elected president, Dr. W. J. Sloan, corresponding secretary, and D. V. Whitney, recording secretary. It has for its object "the collection and preservation, under its own management and control, of all historical facts, manuscripts, documents, reports and records, in regard to the history of this territory; Indian antiquities and curiosities, geological and mineralogical specimens, geographical maps, and information and objects of natural history." Our society already numbers over 70 members, although but two months in existence; and new applications are being received every day.

D. V. W.

Santa Fe, New Mexico, Feb. 27, 1860.

CHECK VALVES.

MESSRS. EDITORS:—Will you be kind enough to explain the action of a check valve? Also, all the signs by which water on a level (or when there is sufficient water) issuing from a gage cock, when it is opened, may be distinguished from foaming and other deceptive appearances? ARCHIMEDES.

New York, April 17, 1860.

[A check valve operates in the same manner as the delivery valve of the feed pump, being opened by the pressure of the water as it is forced through the feed pipe by the pump plunger, and closed by the pressure of steam in the boiler, aided by the pressure of the atmosphere, when the plunger moves back. The object of using a check valve is to keep the feed pipe shut off from the boiler at all times except while the water is being forced in, and thereby enable the pump to be repaired while steam is up, and prevent any injurious effects being produced by the accidental bursting of the feed pipe. The foaming of boilers is something which can only be detected by practice. A practical engineer detects it as much by the sound produced by opening the gage cock as by occular evidence; and on locomotives, at night, there is frequently no other way of ascertaining the condition of the water.—EDS.

WATER GAS.

The Philadelphia *Ledger* states that the committee on gas of Councils, are now investigating the cost of the manufacture of coal and water gas. The committee have not yet completed their labors, but the following figures, showing the comparative cost of the two kinds of gas, were obtained from a gentleman who had made experiments. The mode of making the water gas is not given.

Cost of coal gas.—Materials: Coal (less amount of coke sold), 56½ cents per 1,000 cubic feet; purifying, 2½; labor, 17½; repairs (incident to manufacturing), 18½; cost of manufacturing 1,000 cubic feet of coal gas, 95 cents.

Cost of water gas.—Materials: Rosin, coke, charcoal and lime, 61 cents per 1,000 cubic feet; purifying, 12½; labor, 26¼; repairs (incident to manufacturing), 38; cost of manufacturing 1,000 cubic feet of water gas, $1.37¾.

[The above figures show which gas is the more expensive; but we think that this cost for manufacturing 1,000 feet of coal gas is too high. About 7,000 cubic feet of gas are obtained from a tun of moderately good coal.—EDS.

SCIENTIFIC HELP WANTED!—The Polytechnic Institute, whose proceedings are reported from week to week in our columns, is likely to talk itself into the ground, unless the ranks of its disputants are speedily re-inforced. However learned and amiable Messrs. Fisher, Mason, Dibben, Dr. Stevens, &c., may be, it is very certain that they do not know *everything*; and if they undertake to enlighten the public upon all sorts of practical subjects, they must ultimately be guilty of "getting-off" more or less scientific nonsense. Unless prompt and energetic aid is rendered, the hope of the Institute, that it may yet equal the French Academy at Paris, will be completely blasted, and it will come to "a lame and impotent conclusion."

WILL THE COAL-FIELDS HOLD OUT?—Professor Rogers, after showing the areas and solid contents of the various known coal-fields, estimates that, at the present rate of consumption (100,000,000 of tuns per annum), the coal-fields of Pennsylvania alone would meet the demand for 8,164 years. If the consumption were doubled, viz.: 200,000,000 of tuns, the great Appalachian field would meet the strain for 6,937½ years. If it were quadrupled, viz.: 400,000,000, the productive coal-fields of North America would suffice for the world's supply for 10,000 years to come.

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THE OBSTRUCTION TO THE NAVIGATION OF RIVERS CAUSED BY THE PIERS OF BRIDGES.

BY J. W. SPRAGUE.

The investigation, which was interrupted at the close of my last communication, as to the amount of power required for the ascent of a steamboat of specified dimensions through a given draw, was based upon the supposition that, so far as vertical resistances were concerned, all the power of the engine was usefully employed in overcoming the resistances; that there was no loss of power between the point where it was derived from the engine, and the point where it was applied to overcome the resistances. In truth this is far otherwise. Let us look at the causes of loss of power in its transmission. Those that I will consider arise from three sources—the *friction* of the wheel, the *obliquity* with which the paddle boards (in the case of the ordinary radial wheel) strike the water, and the *slip* of the wheel. Of these three causes of loss of power, the operation of the first two, in case of a steamboat ascending a draw, is similar to their operation in case of a steamboat moving in an unobstructed water-way. The operation of the *slip* is quite different. The first two may then be disposed of by assuming that, of the entire power given up by the engine, $\frac{1}{3}$th is consumed by them.

As regards the introduction of specific values, I would state that my object is to show *how* the values are to be used, not *what values* are to be used; and while in each case the values given are based upon the best data in my possession, yet I wish distinctly to disclaim for them great accuracy. The careful reader will readily distinguish between those values which are liable to variation, and those which are not; for instance, when it is stated that, to lift a boat of specified weight up a *remou* of definite hight requires the expenditure of a given amount of useful effect, there is no liability to error; but when we go further, and state that to accomplish this useful effect requires an expenditure of a particular amount of power at the engine, then we enter the region of uncertainty, the values varying with the medium through which the power is transmitted.

In order to determine the loss of power occasioned by the slip of the wheel when in the draw, it will be necessary to analyze the causes producing the slip. Take the case of a locomotive drawing a train of cars, at a definite uniform velocity, on a level dry track, where the adhesion of the driving wheel to the rail is perfect, and there is no slipping. The measure of the power expended, in going a specified distance, is the product of the equivalent mean pressure on the piston, multiplied by the distance passed over by the piston. The useful effect produced is the product of the constant tractive power required to draw such a train at such a velocity, multiplied by the actual distance passed over. Neglecting the loss of power within the engine itself by friction, &c., these two products will be equal, and the power expended will equal the useful effect produced. Again, suppose the same train to maintain the same velocity over another equal portion of *oiled* track, where the adhesion is not perfect. The useful effect produced will be the same as in the first case, for the oiling of the track may be regarded as having no effect on the tractive power required to move the train; but in order to maintain the same tractive power, on account of the *slip* of the wheel, it must revolve faster than in the first case, which implies an increased velocity of piston, and expenditure of power, without any increase of the useful effect produced. If, while the train advances three feet, the wheel rolls over four feet, the *slip* of the wheel will be one foot, or one-third of the velocity of the train: and as four parts of power are required to produce three parts of useful effect, one-fourth of the power expended is is wasted, or we must add one-third to the useful effect, in order to obtain the power to be expended for its production.

Just so is it in the case of a steamboat. If the wheel revolved with a velocity equal to the velocity of the boat, the paddles would quietly enter the water without striking against it; but as water is not a solid, but a yielding fluid, it is necessary that, in order to push the boat forward, the paddles must strike the water with an increased velocity. The increased velocity of the paddle wheel, requisite to convert the yielding water into a resisting medium, corresponds to the increased velocity of the driving wheel of the locomotive, requisite to maintain the necessary adhesion to the track. All power expended in overcoming the *slip* is lost in both cases. The amount of *slip* in the case of a steamboat will vary with different velocities, but for our purpose we may take the proportions given above, in the illustration of the locomotive, viz., one-third of the velocity of the boat. This value is, however, based upon the supposition that the velocity of the boat is *uniform*, and that the only resistances are those due to the boat's own motion, at any given velocity in *level* water.

Suppose, however, a steamboat has another boat in tow, then it is evident that to maintain any speed, the paddles must strike the water with more velocity than would be requisite for the same speed, if there was none tow—but the *slip* measures the velocity with which the paddles strike the water, and consequently in such a case the *slip* will be materially increased. Hence, whenever any steamboat encounters a resistance greater than that which is due to the boat itself moving at its present speed, the per-centage of slip will be increased. When a boat is increasing its speed, its resistance is measured, not merely by its present speed, but to this must be added the resistance due to the effort to increase the speed. When a steamboat is moving uniformly, at the rate of five miles per hour, the *slip* is less than of the same boat increasing its speed from four to six miles per hour, at the instant when it reaches five miles per hour.

When a steamboat ascends a draw, it encounters greater resistance than that due to the velocity of the current added to its own velocity; hence, for the reasons just given, the relative loss of power by *slip* is materially increased. In view of what has been said, I have little doubt that in case of a steamboat ascending a draw, the loss of power from the three causes alluded to amounts to one-half of the whole power.

In determining the power required to overcome the horizontal resistances, these losses were taken into account; but they were not taken into account in estimating the power required to overcome the vertical resistances. Hence, doubling the power previously given as useful effect, we have, in the illustration of the last number, for the power required to overcome the vertical resistances—

when $t =$ 60 seconds, 162 Horse-power.
$t = 120$ " 130 "
$t = 180$ " 118 "

and for their total power—

when $t =$ 60 seconds, 251 Horse-power.
$t = 120$ " 176 "
$t = 180$ " 153 "

Estimating this in the erroneous manner indicated at the close of the preceding article, we should have—

when $t = 60$ seconds, $133 + 66 = 199$ Horse-powers
$t = 120$ " $75 + 34 = 109$ "
$t = 180$ " $59 + 22 = 81$ "

The per-centages of error of this method would be in this case 20, 38, and 47.

In order to contrast the result just obtained with another, take the same steamboat already described, and examine its ascent through a draw, constructed precisely the same as the last, but where the original velocity of five and a half miles an hour was increased to six. Take the time of ascent at 120 seconds. Five and a half miles per hour increased to six is 8 feet per second increased to 8.8. The corresponding hight of *remou* would be 0.23 feet. Here—

$W = 1{,}875{,}000$
$b = 0.23$
$t = 120$
$v^{\circ} = (8 + 8.8) \div 2 = 8.4$
$l = 240$

Which gives for the useful effect to be expended in overcoming the vertical resistances $P = W b [1 + (tv^{\circ} \div l)] = 2{,}242{,}500$ feet pounds. As this work is to be done in 120 seconds, we have $P = 34$ horse-power of useful effect, requiring on account of losses 68 horse-power of expenditure. The relative horizontal velocity of the boat is $v^{\circ} + (l \div t) = 10.4$ seconds, requiring for its accomplishment 104 horse-power. Hence the total power required will be $104 + 68 = 172$ horse-power. In the preceding illustration, where $t = 120$, the power required was 176 horse-power, showing that, of two draws constructed precisely alike, it requires less power to carry a steamboat up through one of them, where the velocity is six miles per hour than it does through the other, where the velocity is one mile less, or five miles per hour.

The question naturally arises: If the equivalent mean power required to carry a steamboat up through the draw exceeds the maximum power of the engines, will it be impossible for such a boat to make the ascent? By no means. When a moving body meets any resistance tending to check its motion, the inertia of the body comes into play as an active power to aid in overcoming the resistance. When the velocity of a steamboat is diminished by the resistances encountered in ascending a draw, then the inertia of every pound's weight of the boat and cargo comes to the aid of the engine. The measure of the power stored up in the inertia of a body is $(W \div 64.4)\, v^2$. W being its weight in pounds, and v its velocity in feet per second. It must be remembered, however, that this power is not available until the velocity begins to be checked. To apply this to the case last given:—What is the least power of the engine of the steamboat, to allow it to make the ascent, and leave the draw with an actual velocity of hal. a mile per hour?

Half a mile per hour is 0.7 feet per second, which, added to the velocity of the current above (8.) gives for the equivalent velocity with which the boat leaves the draw, 8.7 per second. Let x represent the number of horse-power required; y represent the greatest velocity which can be produced in still water by x; then y will be the relative velocity with which the boat approaches the draw. As the power required varies as the cube of the velocity, and as a velocity of 10 feet per second corresponds to 93 horse-power, we have $y^3 : 10^3 = x : 93$, and $x = (93 \div 1000)\, y^3$. The power (stored up in the inertia) with which the boat leaves the draw will be—$(1{,}875{,}000 \div 64.4) + 8.7^2 = 2{,}203{,}710$ feet lbs. The power consumed in making the ascent will be $172 \times 550 \times 120 = 11{,}352{,}000$ feet pounds. The power given out by the engine during the ascent will be $x \times 550 \times 120 = 66{,}000\, x$. The power (stored up in the inertia) with which the boat approaches the draw will be $(1{,}875{,}000 \div 64.4) \times y^2 = 29{,}115\, y^2$. The power present, *plus* the power developed during the ascent, must equal the power consumed during the ascent, *plus* the power remaining after the ascent. Hence we have—

$29{,}115\, y^2 + 66{,}000\, x = 11{,}352{,}000 + 2{,}203{,}710 = 13{,}555{,}710.$

$29{,}115 y^2 + 66{,}000 \times (93 \div 1000) y^3 = 13{,}555{,}710.$

$9{,}705\, y^2 + 2046 y^3 = 4{,}518{,}570.$

This equation may readily be solved by approximation; trying different values of y, until one sufficiently accurate is arrived at. As y must evidently be greater than the velocity (8.7), with which the boat leaves the draw, take at random $y = 10$.

When $y = 10$ $9{,}705\, y^2 + 2046\, y^3 = 3{,}016{,}500$ (too small)
" $y = 11$ " " $= 3{,}897{,}531$ "
" $y = 11.5$ " " $= 4{,}395{,}190$ "
" $y = 11.7$ " " $= 4{,}605{,}420$ (too large)
" $y = 11.6$ " " $= 4{,}499{,}490$ (too small)

Hence as 11.6 is too small, and 11.7 too large, the true value lies between them; but, as we only carry the value of the velocity to one place of decimals, 11.6 is nearer the true value than 11.7, hence we have—

$y = 11.6$
$x = (93 \div 1000)\, y^3 = 145.$

Hence, instead of 172 horse-power, we have 145 horse-power, as the requisite capacity of the engine, to enable it to fulfill the given conditions.

In estimating the amount of power necessary to carry a steamboat up through a draw, we have considered only the power necessary to ascend the *remou*. The *remou* is situated just at the head of the piers, consequently before a boat reaches the foot of the *remou*, or commences its ascent, it will have to encounter *level* water moving with the velocity V. The resistance offered by this rapid current in the draw must be estimated according to the method previously given for estimating *horizontal* resistances, and the amount added to the power required for ascending the *remou*. It is evident that the greater the length of the draw, the longer the time the boat will be exposed to the rapid current V; consequently the draw should be made as short as possible.

In conclusion, I would state that the objects aimed at in the present investigation were twofold, first to obtain a simple and reliable method of measuring the increase of velocity and hight of *remou*, caused by the piers of bridges; and secondly, and principally, having obtained these values, to indicate a method by which the *obstruction to navigation* resulting from the accelerated velocity of the current, and the piling-up of the waters, might be accurately measured. That the method here suggested is faultless is not contended. I only claim that it is more accurate, full, and simple, than any other I have been able to find recorded.

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POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 4th inst., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the president, C. Mason, in the chair.

MISCELLANEOUS BUSINESS.

Sawmill.—Mr. Pierson Crosby exhibited a neat and complete working model of a sawmill. The chief points of novelty in Mr. Crosby's invention is his method of applying the power at the bottom of the saw from a horizontal pitman. Besides this, Mr. Crosby claims improvements on devices for securing rigidity, feeding, &c. The model and its working was much admired by the club.

Dr. Stevens—I have been told by an old sawyer, that, the first sawmill was built on the Housatonic river, in Connecticut. Shortly after a mill was erected at Bainbridge on the Susquehanna. Circular saws are of a more recent period.

Mr. Johnson—My father set up a circular saw for cutting lath about 40 years ago.

Solidified Coal Dust.—Mr. John O'Doris, of Philadelphia, exhibited specimens of his patent coal dust fuel. He takes 75 parts coal dust, 10 coal ashes, and 5 parts each of coal tar, street garbage and sawdust, and after mixing them them thoroughly, divides and compresses the mass into lumps of suitable form. The cost of the patent fuel is nearly the same as of good coal.

The President then announced the regular subject:—"Means of Transport to and from New York."

DISCUSSION.

Mr. Fisher—What is desired for a road on which steam is used as the power is: first, high speed with safety; second, freedom from dust and mud; third, ventilation and warming; fourth, that the carriage shall go whenever wanted, and stop whenever required. On such basis Mr. Fisher argues that the road surface should be cast iron, but slightly crowning and several times the width of the carriage; it should be nearly smooth so that there should be no lodgment for dirt, and grass should be made to grow on either side. The carriages should be small, so that they could be stopped at little expense, but large enough to convey 20 or 30 passengers. The wheels requiring no flanges, much of the friction, wear and tear of the common railway would be avoided. Such a carriage may be stopped for a single passenger, while to stop an average railway train costs 90 cents.

Mr. Godwin—The Harlem Co. confessed under oath at a late legal investigation, that it cost them 40 cents to stop a train.

Mr. Fisher—The cost of stopping a train will evidently depend upon various circumstances. Engineers make their calculations by assuming that it varies with the weight of the train multiplied by the square of the velocity; 90 cents is a fair average estimate.

Mr. Dibben—What velocity have steam carriages found to be practicable on common roads.

Mr. Fisher—My carriage has run 3½ miles at the rate of 32 to 35 miles per hour on a soft gravel road?

Mr. Holton of Brooklyn read a paper written about 15 years since, by which he showed that he had anticipated much of our present city railroad system.

Mr. Fisher—[In answer to a question.] The heating surface to the weight of my carriage is as 1 to 75.

The President—I once asked a city railroad director why they didn't spare about 2,000 lbs. from the weight of their cars. He replied that the extra weight was used to knock the carts out of the way. This was several years ago, the cars are lighter now.

Mr. Dibben—The cars are now made as light as is consistent with strength. They weigh about 4,000 lbs.; formerly they weighed 6 to 8,000 lbs.

Mr. Larned—I consider the railroad the best system wherever the business warrants the outlay of capital to build it. The steam carriage system as proposed by Mr. Fisher, comes in competition with the railroad and everything else. I consider Mr. Fisher's plans the best yet proposed, yet they require the practical test. The proper field for steam carriages is that which our city stages now occupy. Also steam carriages may be useful as tributaries for railroads and steamboats. There are now too many branch railroads which are merely feeders for the longer lines. Steam carriages might often with advantage be substituted for them. But the steam carriage cannot, to much extent, take the place of the ordinary pleasure carriage. Road beds need improving, and when improved, they will be better for any transport. Locomotion on the railroad is guided by the rail, but steering a steam carriage going at the rate of 30 miles an hour is unsafe and impracticable, in 10 seconds you might go over 400 feet out of the way. Our success with locomotive fire-engines has been gratifying, but not sufficient to convince us that it is best to rely on steam. We have run on a grade of 1 foot in 8, at 18 miles per hour, and 12 to 14 miles is an easy jogging rate, but my fears are about steering.

Mr. Fisher—The railroad is called a success, but look at the depreciation of stock; two-thirds of the capital invested is virtually sunk. It was once thought that rail-cars would not go faster that 2½ miles per hour, and in wet weather not at all. The prospect of steam carriages is now better than that of railroads at first. Steam carriages, so far, have not failed from bad steering. The skill that may be acquired from practice will overcome all difficulties. It would not require more dexterity than our ordinary acrobats display. Rail-cars at first jumped on the track and sometimes off.

Much of the time at the opening and close of this meeting was occupied in the discussion of the rules of the club, a report of which is omitted as being of little interest to the public.

After agreeing upon the subject for the next meeting—"Fire-escapes" and "Iron Buildings," the association adjourned.

ENGRAVING ON GLASS.

We translate from *L'Invention* the following account (by Mr. Gugnon) of a new process of engraving on glass, for printing the patterns for embroidery, netting, crotchet, &c., by which it is said that the labor of a month in this kind of engraving can be performed in one day. The process consists in etching by means of hydrofluoric acid which, as our readers are aware, has the remarkable property of corroding glass:—

1. *Substances Employed.*—It is known that certain fatty and resinous substances are not soluble in hydrofluoric acid. Among these substances the author chooses the bitumen of Judea, to which he adds one-sixth part of gum mastic (mastic in tears); he then reduces the whole to an impalpable powder.

2. *The Design.*—The design is cut in stencil, either in paper, parchment or metallic plate, in a way to cover those portions of the glass which are to be attacked by the acid, and to leave exposed those parts which are not to be attacked.

3. *The Application of the Process.*—The glass is placed horizontally and varnished with a very thin coating of any fatty substance (the author prefers the essence of turpentine); and the stencil plate is laid on the varnish while it is fresh. The asphaltum powder is then sifted through a very fine sieve over the surface of the stencil plate and the glass, and the plate is carefully removed, thus leaving the powder upon the glass in figures corresponding to the open parts of the plate. The glass is next exposed to gentle heat which causes the essence of turpentine to combine with the asphaltum and the gum mastic, and the mixture, in melting, fixes itself to the glass

4. *Treatment by Acid.*—The pattern is surrounded by a ridge of soft wax prepared for the purpose, and hydrofluoric acid, diluted with one-third its volume of water, is poured over it. In about 40 minutes the etching is completed.

AN ENTIRE ACRE OF HOUSES IN MOTION! — The entire front of first-class brick buildings on the north side of Lake-street, between Lasalle and Court-streets, is now rising to grade at the rate of about 12 inches per day. It will be at its full hight by to-morrow night, when it will constitute a spectacle not many of our citizens may see again, if ever—a business block, covering nearly one acre, and weighing over 25,000 tuns, resting on 6,000 screws, upon which it has made an upward journey of 4 feet and 10 inches. Probably its parallel enterprise cannot be found, the world over. It will be worth seeing to-morrow, and the contractors are, we learn, preparing to accommodate the public and give them an opportunity of looking and passing in among the forest of iron screws. Then we propose to say something more in detail regarding this notable and wonderful enterprise, to which we have often made reference.—*Chicago Tribune.*

A COLUMN OF VARIETIES.

Photographs are now taken at night, by means of an artificial light called the *Photogen*.....It is estimated that England pays annually $300,000,000 for manure—more than the entire commerce of this country. The total value of a year's crop has been reported to Parliament, some time ago, as being about $3,000,000,000; the crop includes the animal as well as the vegetable.....Extensive deposits of coal have been found in Liberia; all the hilly ranges abounding with it.....In exhuming some bodies in a family grave-yard near Crawfordsville, S. C., the body of a woman buried some 12 or more years ago was found a petrifaction, with each article of dress perfect.....Mr. Bryant's eulogy on Washington Irving is one of the finest pieces of composition in the language—appreciative, manly, polished, and in admirable taste. .....Juarez (pronounced Wharays), the leader of the liberal or anti-church party in Mexico, is a full-blooded Mexican Indian.....A census of the population of Rome has been completed, from which it appears that the total of the inhabitants is 180,357, a figure at which this petrified or stereotyped city has remained for the last 250 years, without any symptom of that progressive development which has enlarged, enriched and enlightened every other European capital. In the muster-roll there are 34 bishops, 1,331 secular priests, 2,404 monks, 1,872 friars, 2,700 nuns, and 850 seminary students.....Large numbers of our exchanges now come to us with the direction printed upon them with a machine. The variety in the appearance of the addresses shows that several of these inventions have been introduced into practical use..... The statement that Jackalow, the Japanese who is suspected of having murdered Captain Leete and his brother, of the oyster sloop *Spray*, is the same person who was with Capt. Perry in his voyage to Japan, is contradicted by one who seems to know.....The strike of the shoemakers in Massachusetts is ended; most of the workmen obtained an advance, though some did not. At Haverhill, an account of receipts and expenses was presented, showing that out of $431 collected, $264 had been paid for "town-hall, horse-hire, travel, printing and incidental expenses," the needy receiving for their relief only $167. The same result is anticipated in the other towns.....All the colors have been produced by photography, but it has been heretofore impossible to fix them. It is now stated that Mr. Toussaint, of France, has succeeded in fixing these colors permanently; and that, consequently, we are to have photographs of objects in all their natural colors. The principal substances used are reported to be oil of pink and chloride of gold.....The great steel bell which was cast in Sheffield for the San Francisco Fire Department has been brought to this city, and hung in the Park to compare its sound with that of our City Hall bell. It is very sonorous, with a clear and melodious note.....It has been supposed, from a careful counting of a portion of the rings and from comparison with other trees, that the large tree, of which a portion was brought to Philadelphia from California, was about 1,800 years old.....The deepest artesian well in the United States is the one at Columbus, Ohio, which is 2,840 feet in depth—more than half a mile.....During the late strike of the shoemakers of Massachusetts, Mr. Bacheldor, a shoe-manufacturer stated at a meeting that he has, at the present time, in his possession the first pair of pegged shoes that were made in New Hampshire. They were made by the soldiers in 1812.....The tea-plant is cultivated in Louisiana without any difficulty. It has shown its power to withstand the hottest days of Louisiana, and also the late freezing cold weather.....The ship *Great Tasmania*, which lately arrived at Liverpool from Calcutta, with over 1,000 men who retired from the Indian army on the transfer of the East India Company's service to the British government, had a fearful amount of sickness and mortality on board. It is charged that, owing to bad and insufficient provisions, and the want of proper accommodations, the ship became a perfect floating hospital! There were, at one time, 400 or 500 men sick on board, of whom 60 died at sea, and a large number were landed at Liverpool in a dying state. A government investigation into the matter has been commenced.....It is announced that the Prince of Wales, the heir-apparent of the British crown, will leave England on the 10th of July for his visit to Canada. The Canadians are in a great fever of loyalty in anticipation of the arrival of the august visitor.

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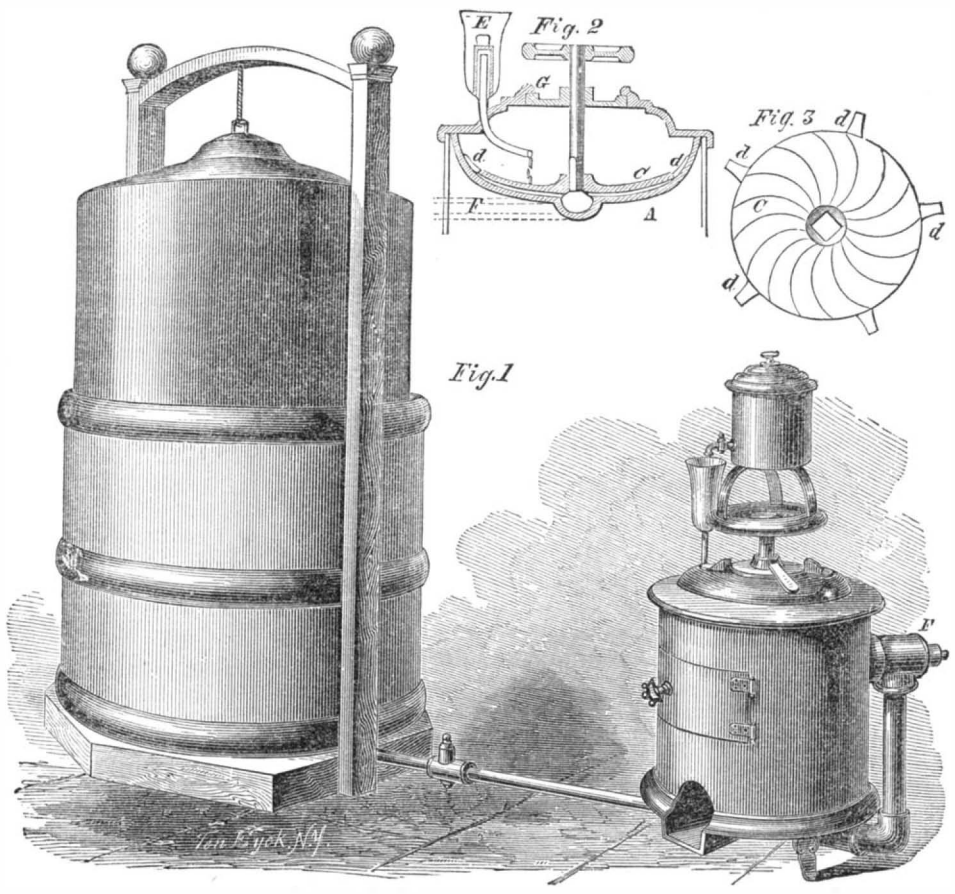
IMPROVED GAS APPARATUS.

We can conceive of no invention which would be more valuable to the country than a cheap and compact gas apparatus, to be operated by the common kitchen fire, and which should be free from all material objections. Our inventors are exploring this inviting field with considerable assiduity, and, if the desideratum is not already obtained, we are not without hopes that it yet may be.

The simple apparatus which we here illustrate is designed for making gas from grease; the same fire being employed that is used for heating the room to be lighted. Fig. 2 is a vertical section of the principal parts, Fig. 3 being a plan view of the same. The fire is made in the cylinder, A, the upper part of which is completely occupied by the convex plate, B. Resting on the upper side of this plate is the pan, C, which is the main feature in this invention. It is made with curved grooves passing from the center to the periphery, as shown in Fig. 3, and is provided with supports, *d d d d d*, so that the greater part of its surface may be prevented from coming in contact with the heated plate, B. The grease is placed in the cup, E, and as it melts it falls in drops upon the pan, C. The heat of this pan is sufficient to evaporate the grease but is not sufficient to decompose much of it into permanent gas. As the vapor rises and fills the upper part of the cylinder, it flows down below the pan, C, where it comes in contact with the more highly heated plate, B, by which it is decomposed into permanent gas, when it flows out through the pipe, F, Figs. 1 and 2, and is conducted to the gas receiver.

The essential feature of this invention consists in evaporating the grease by metal at one temperature, and then bringing the vapor in contact with metal at a higher temperature by which it is decomposed.

The patent for this invention was issued to Allen B. Wilson, Oct. 26, 1858, and persons desiring furth r information in relation to it will please address C. A. Durgin, at No. 335 Broadway, this city.



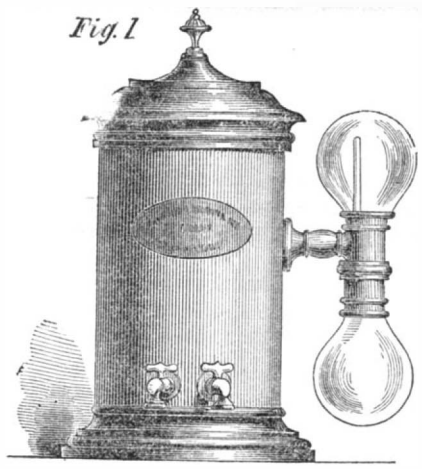
WILSON'S IMPROVED GAS APPARATUS.

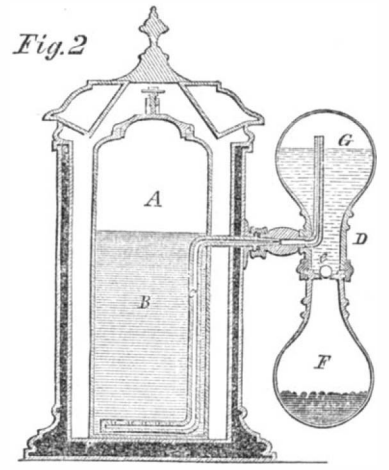
WARKER'S APPARATUS FOR IMPREGNATING LIQUORS WITH CARBONIC ACID GAS.

Carbonic acid, though a deadly poison when inhaled in the lungs, is wholly beneficial in its effect upon the stomach. Indeed, water is unfit to drink unless it is impregnated with either this gas or atmospheric air. Water has the property of absorbing its own volume of carbonic acid, and as a larger quantity of the gas is contained in a given volume when it is condensed by pressure than when it is not condensed, the quantity which water will absorb depends entirely upon the pressure to which the gas is subjected. If the water is saturated with the gas under a high pressure and then the pressure is removed, a portion of the gas escapes, leaving that quantity only in the water which is equal in volume under the pressure of the atmosphere to the volume of the water. As the carbonic acid escapes, it expands from the liquid state in which it existed while it was dissolved in the water, and assumes the gaseous form, appearing in numerous bubbles all through the liquid, which by their greater levity float up to the surface. Hence the effervescence of soda water, of champagne, of cider, &c.

Carbonic acid generally exists in the gaseous form when it is separate from other substances, but in chemical combination with other bodies it generally occurs solid, and the usual mode of procuring it is by decomposing some compound of which it forms a part. Either the carbonate of soda or the bicarbonate is most frequently employed. As soda has a feebler affinity for carbonic acid than it has for sulphuric or tartaric acid, when the carbonate of soda is brought in contact with either of the latter acids it is decomposed, and the carbonic acid is set free; the presence of water, however, being necessary to effect this change.

In making soda water, some manufacturers place the carbonate of soda and tartaric acid directly into the water, and as a portion of these substances is dissolved,





Improved Soda Water Apparatus.

it is of course taken into the stomach with the water, in the form of tartrate of soda, which is injurious to health. It is common, therefore, to so arrange the apparatus that the carbonic acid may be set free in a separate vessel, and conducted into the drinking water by a pipe, so as to keep the soda entirely out of the beverage.

The invention which we here illustrate is an improvement on this variety of soda apparatus, and consists essentially in the mode by which the portion of water necessary for the decomposition of the salt is admitted to the mixture of the acid and carbonate of soda. The drinking water, B, which is to be impregnated with the carbonic acid, is placed in the strong vessel, A, which is lined in the usual manner to prevent the action of the acid upon the material, and surrounded with a strong metallic case to resist the pressure of the gas; charcoal or other non-conducting substance being interposed between the vessel and the case to keep the water cool. A pipe, C, leads from the bottom of the water where it is perforated with holes, and passes out through the side of the vessel, where the generating vessel is connected to it by a swivel joint. The vessel, D, is made in two parts, communicating with each other by a small opening, which is closed by the ball valve, *e*. This valve, in connection with the swivel joint, is the main feature in the improvement. The soda and acid are placed in the lower part, F, of the vessel, while the upper part, G, is nearly filled with water. By tipping the vessel either towards or from the spectator, as seen in the cut, the ball, *e*, rolls from its seat, and allows the water to fall upon the acid and soda, by which the chemical action is produced and the gas set free. The gas bubbles up through the water, lifting the valve in its course sufficiently for its own passage, and flowing over into the water, B. The generation of the gas in a limited and confined space produces, of course, pressure, which is suffered to reach a point of about 180 lbs. to the inch, at which pressure there is six times the gas in a given bulk that there is in a vessel open to the air. Consequently, when water which has become saturated with gas at this pressure is allowed to escape into the air, it will part with five-sixths of its carbonic acid. The gas, however, does not escape suddenly, but gradually, so that when we swallow a tumbler of soda water it still contains a large amount of carbonic acid, which gives it a pungent taste, and produces a peculiarly pleasant, exhilirating and healthful effect upon the system. In some kinds of apparatus the gas is produced separately, and then condensed in contact with the water by means of a force pump.

The patent for the invention above described was procured, through the Scientific American Patent Agency, April 27, 1858, and persons desiring further information in relation to it will please address the inventor, Thomas Warker, at 181 Grand-street, this city.

UNPARALLELED SUCCESS IN OBTAINING PATENTS—FORTY-SIX ISSUED TO THE PATRONS OF ONE AGENCY IN A SINGLE WEEK!—Under the official report of patents issued for the week ending April 10, 1860, it appears there were one hundred and eleven patents granted. Of this number, *forty-six* were obtained through the Scientific American Patent Agency, a larger number (by five) than was ever before issued through this office in a single week. Many of these were cases prepared by the inventors, or by incompetent persons whom they had employed, and had been rejected, and afterwards placed in our hands for attention. Inventors who have made applications for patents, and been rejected, are advised to send us the official letters-of-rejection and to correspond with us concerning their cases. We are happy at all times to render advice, and impart information to those soliciting it, *free of charge*.

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Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

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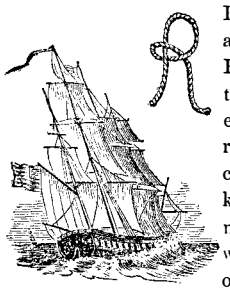
VOL. II., NO. 17.....[NEW SERIES.]....*Fifteenth Year.*

NEW YORK, SATURDAY, APRIL 21, 1860.

THE GROWTH OF OUR SHIPPING.



REPUBLICANISM has been in all ages the parent of commerce. From 600 to 300 years before the Christian Æra, there existed in southern Europe that remarkable collection of little commonwealths which are known to us under the common name of Greece. Each state was perfectly independent of the others, and they possessed very various forms of government, from the oligarchical double monarchy of Lacedæmon to the pure democracy of Athens. In all, the growth of commerce was proportioned, with singular exactness, to the extent of the democratic element in their constitutions; Lacedæmon having none, while Athens founded a great maritime empire, and established colonies on all the shores and among all the isles of the Black, the Ægæn, and the Mediterranean seas. When Barcelona had, by the conquest of her independence, secured for herself more than the full measure of the constitutional freedom of Aragon, she became for a time the leading commercial city in the world, whitening all known seas with the sails of her shipping. The establishment of the Italian republics of the Middle Ages marks a memorable epoch in the history of commerce. In the fourteenth century, Venice, Genoa and Pisa, which were scarcely more than single cities, armed fleets more powerful than any empire could muster, and sent them forth to contend in fierce rivalry for the trade of the Mediterranean. In the sixteenth century, the inhabitants of the Netherlands, by one of the longest and most heroic struggles recorded in history, succeeded in founding the Dutch republic among their fens and islands; and they experienced, among other invariable blessings of free institutions, a wonderful growth in commercial greatness. They established colonies in every quarter of the globe; including the settlement of New Amsterdam, which has since grown into this metropolis of the Western World.

But it has been reserved to our own day to witness, in two great states, a more perfect consummation of individual liberty, than has ever before been enjoyed, in combination with civilization and established law, by any portion of the human race. And the consolidation of the free institutions of England and the United States has resulted in an extension of their commerce, which has cast that of all other nations and times into utter insignificance. The total shipping of the globe amounts to about fifteen millions of tuns, of which Great Britain has about five millions and the United States also about five millions, leaving the same number to be divided among all the other countries. While the shipping of these two nations embraces two-thirds of that of the whole earth, our population combined amounts to only six per cent of the population of the world.

In another column we publish a table of the shipping belonging to the United States for each year since 1815. and of that belonging to the British empire, since 1820. It will be seen that we have passed Great Britain proper, in the race, and that our shipping now very nearly equals that of the whole British empire, with its seven millions of square miles, and its 160,000,000 of population.

The diversion of a considerable portion of the Atlantic passenger trade to British steamers has caused some anxiety in this country in regard to the final supremacy of our shipping; and our own suggestion, that this diversion might be owing in part to the introduction of iron as a material for ships, has given rise to some little unpleasantness among a small portion of the builders of wooden vessels. There was no occasion either for anxiety or for soreness. Of course, we could have no other feeling in the matter than a desire to see our country in advance of all others; and we have not the slightest fear of any other result. Whatever material may be best, we have no doubt that it will be discovered and adopted by the enlightened self-interest of our merchants and shipbuilders. We have already completely distanced all other nations except England. She has *one* great advantage over us, in the possession of more ample capital, and the consequently smaller interest exacted for its use. She was an old and rich nation when the inhabitants of this country consisted of painted savages. The property that we possess has been acquired while we were hewing down the forests and building the fences over the millions of square miles of our territory. But, unless some change has taken place in human nature, supremacy on the ocean is decreed to us in the very structure of our institutions. While we have at least as large a measure of personal freedom, and at least as perfect protection of life and property as is enjoyed in England, we are free from the burdens of a privileged nobility, a government church, and a national debt, which press with no inconsiderable severity on the enterprise and industry of our kindred across the Atlantic.

EDITORIAL CORRESPONDENCE.

NEW PATENT BILL—TELEGRAPH EXTENSION CASES—CONDITION OF THE PATENT OFFICE—ASSISTANT EXAMINERS, &C.

WASHINGTON, April 10, 1860.

More than thirty years ago, Sir Humphrey Davy, in his "Consolations in Travel," gave utterance to the truth that "the beginning of civilization is the discovery of some useful arts by which men acquire property, comforts, or luxuries. The necessity or desire of preserving them leads to laws and social institutions. The discovery of peculiar arts gives superiority to particular nations; and the love of power induces them to employ this superiority to subjugate other nations, who learn their arts, and ultimately adopt their manners; so that in reality the origin as well as the progress and improvement of civil society is founded in *mechanical and chemical inventions.*" England, although reaching it by a somewhat awkward process, discovered the substance of this fact in 1624, when the royal assent was given to an act for the protection of inventions for Letters Patent. Our own admirable constitution also takes cognizance of the same important truth, which gives unto Congress the power to protect the discoveries of inventors and the writings of authors. England has been vastly benefited by the encouragement thus given to the useful arts; and the United States would have moved on with a snail's pace, but for the *impetus* which was given to invention by the patent law of 1836. One of the most enlightened sovereigns of Europe, and one whose acts are now attracting the attention of the whole civilized world, is Victor Emanuel, King of Sardinia, Cyprus and Jerusalem. With a mind imbued with a spirit of progress worthy of this age, he seems ever active in devising such measures as will promote the best interests of his subjects. He evidently thinks that there is something to be done besides diplomatic intrigue, and listening to the fawning sycophants who hang about his court. Accordingly he is active in establishing some better system for the protection of the inventor; and thus promoting the progress of the useful arts in his kingdom. Within the past year he has *ordained* an act of this character, which contains some excellent provisions.

Now, while Victor Emanuel seems to be emerging into light, *our* government is, to all appearance, drifting away into the sea of indifference, respecting its care of this most important matter. I would not be understood to complain particularly of our patent system as it now exists. I think it, undoubtedly, the most just and equitable to be found upon the statute-book; but it has its defects, and no one who pretends to the slightest knowledge of the subject will deny this. And yet, Congress has paid but very little attention, of late years, either to the defects of the law or to the interests of the Patent Office. Every Commissioner, since the days of the late Mr. Ellsworth, has severally reported to Congress the pressing needs of that department. Committees have been annually appointed to consider the subject matter of these reports, and have been furnished with elegant lounging-rooms, with all the refreshing adjuncts at command; bills have been printed, amended, reported and *re-committeed.* Such, in a few words, is a true history of patent legislation for nearly twenty years past. During all this time the business of the Office has gone on steadily augmenting, until, from a few hundred cases annually, the numbers now count up to thousands!

The bill now before Congress is mainly intended to benefit the Patent Office; it therefore has no special *outside* friends, who will hang about the committee-rooms to urge forward its progress. This is one reason why it did not become a law during the administration of Commissioner Mason, for the present bill is, in substance, the same as one which was reported at that time. Now, it appears strange to me, in view of all the facts, that the committees are not more active and zealous in doing their duty to the Patent Office. Hitherto they have left that department to be supported by the fees paid by inventors, and to be managed by the Commissioner of Patents under adverse and often trying circumstances, leaving him to apply such means as his ingenuity could suggest, to enable him to transact its business; while private schemes before the committees have scarcely ever failed to receive more or less attention, simply because a "lobby" influence has urged them forward. I am not disposed to charge corruption against every man that enters Congress. So far as our present patent committees are concerned, I believe they are constituted of honorable men; but the great fear is that other measures, which may seem to them of more importance, may induce them to give the Patent Bill the "go-by."

The readers of the SCIENTIFIC AMERICAN will remember that it was recently announced that the Patent Bill referred-to had been made, by the unanimous consent of the Senate, the special order for Wednesday, the 4th instant. Forgetting all past neglects, and thinking it possible that the Patent Bill *might* come up, I found myself, early one morning, in this city, to which I had been attracted under the expectation of hearing our patent system thoroughly discussed and ventilated. At the raising of the flag, I hastened to the Capitol, and soon found myself seated in the gallery of the new Senate Chamber, with paper and pencil in hand, determined, if possible, to arrest and make note of some of the eloquence and wisdom of our senators, as I imagined it would be poured forth in behalf of inventors. I could almost see the ghosts of Archimedes, Galileo, Torricelli, Guttenberg, Hargreaves, Watt, Franklin, Whitney and other distinguished inventors of past days, coming forth from their resting-places to receive the homage of this great nation. But alas! my expectations were speedily blasted, and I beat a hasty retreat. The bill did not come up; but at the appointed hour the Senate decided to break faith with the inventors once more, and took up the bill to "vote yourself a farm." I have nothing to say against every man's having a farm; for when I think of the thousands of poor human beings dwelling in our large cities in filth, poverty and wretchedness, and who might possibly be encouraged to leave their haunts of misery, if a few broad acres could be given to them, I feel inclined to say "speed the passage of the Homestead Bill." I could not, however, help feeling chagrined that the Patent Bill—a measure so necessary—should have been snubbed, even by so respectable a successor. I think, however, that the bill will receive attention in the Senate very soon; as Senator Bigler, the chairman of the committee on patents, is known to be interested in its success. Its fate, however, is uncertain, owing to a want of knowledge and interest among the senators.

I am pleased to find that Commissioner Thomas is fully alive to the importance of his official duties. The pressure upon him, just now, is very great, owing to the large number of extension cases before the Office. At the time I now write, he has under consideration the application of Professor Morse, for an extension of his telegraphic patent, granted April 11, 1846. Chief-examiner, Capt. Henry, to whom the case was referred by law, rendered an intelligent and lucid report, admitting the novelty and utility of the invention; it is a *model* report, fully characteristic of the man. The extension is warmly opposed by Messrs. O'Rielly, Speed & Eddy; and I believe that Dr. C. G. Page is also working against the ex-

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tension. The interests of Professor Morse are also committed to very able hands; Judge Mason being the senior counsel. Dr. Gale gave, before the Commissioner of Patents, an interesting account of the wonders of electricity, and showed that the germ of the telegraph, as we now have it, really and truly originated with Professor Morse, on shipboard, in the year 1832; it being the result of a scientific discussion which took place at that time, producing a result which has rendered his name famous as a *sciencist*, the world over. Another of the counsel for Morse—C. M. Gwinn, Esq., of Baltimore—gave a graphic account of the results of Professor Morse's genius which, in the transmission of thought, has dispensed with distance, and brought the producer and the consumer, however remotely separated, into daily and even hourly intercourse, and established an equality of prices of agricultural products throughout the land. The closing argument, in behalf of the applicant, was made by Judge Mason; and I have rarely, if ever, listened to a more complete and able vindication of the rights of the inventor. It must have afforded great satisfaction, also, to the Commissioner of Patents, as it brought all the facts of the case most clearly to his mind. The issue before the Commissioner has been unnecessarily complicated by an excess of verbiage, not only in the testimony taken to defeat the application, but also in the rambling mode of discussion adopted by the opponents. As I listened to their mode of argument, I thought of the old adage, "Let the shoemaker stick to his last." It is impossible to say what the Commissioner's decision will be; but the impression prevails that it will be favorable, as, undoubtedly, the rights of the case are with Professor Morse. My sympathies are *always* with *the inventor*—no matter who he is, or where he comes from; and I am willing that he should enjoy all the honors and profits that his inventions can confer upon him, under the most liberal interpretation of the patent laws. When the general laws administered at the Patent Office can do no more for him, then let him be satisfied.

Another important telegraph case is before the Commissioner for extension—that of Royal E. House, for a printing telegraph. Chief-examiner Henry has reported in its favor and, there being no opposition, it will probably be extended.

The condition of the Patent Office is very favorable, so far as the amount of business is concerned; the number of applications is very large; the Commissioner, as well as the examining force, are most thoroughly employed; there is not an idle man in the Office; and thus it may be that Idleness, the prolific parent of Vice, is cheated of some victims. Some Assistant-examiners have, for years past, been doing the work of Chief-examiners, but have received the pay only of assistants; they are among the most useful and laborious officers in the Patent Office, and deserve to receive full pay for their services. They have recently petitioned Congress to grant them an extra amount of pay, which I trust they may promptly receive.

FOREIGN NEWS AND MARKETS.

Electricity Converting Sugar into Alcohol.—It is well known that the effect of fermentation is to change sugar into alcohol; these two substances being composed of the same elements, but in different proportions—sugar consisting of 72 lbs. of carbon to 9 lbs. of hydrogen and 72 of oxygen (C^{12} H^9 O^9), while alcohol is composed of 24 lbs. of carbon to 6 of hydrogen and 16 of oxygen (C^4 H^6 O^2). At the sitting of the Academy of Sciences at Paris, on the 27th of February last, Mr. Niepce de Saint Victor read a paper giving an account of some experiments which showed that, under certain circumstances, electricity produced the same effect on sugar as fermentation does, transforming it into alcohol. He found that, by passing an electric current through very sugary white wine, the wine loses *all* its sugar, and becomes much more alcoholic. On the other hand, the effect of the action of light on absolute alcohol, under certain conditions, is to re-transform a portion of the alcohol back into sugar; the alcohol becoming very sugary, and having its strength reduced several degrees.

Test of Gun Metal.—Says the Liverpool *Albion*:—"We were never so powerfully impressed with the improvements in the manufacture of gun metal as during a recent visit to the Mersey Steel and Iron-works, where we witnessed various attempts to burst a 2-pounder gun. The experiments took place in a small chamber excavated in the sandstone rock, covered over with loose sheets of iron, which, of course, made a considerable rattle when each explosion took place. The gun in question, which is 5 feet 2 inches in the bore, and weighs somewhere about 4 cwt., after being charged with 1 lb. of powder, was filled to the muzzle with 1-pound balls, and fired by means of a string. When the smoke had cleared away, it was found that the gun was all right, and that so great had been the force of the explosion that many of the shot were shattered, and others deeply buried in the rock. The gun was again charged and filled with balls, and a cylinder or round bar of iron, which projected from the mouth. It was then fired with equally satisfactory results. The next trial was with 1½ lbs. of powder and three cylinders, weighing 76 lbs. altogether. This is a test which few guns are calculated to withstand, but, though the noise of the explosion was very great, the metal of the gun was so tough that it remained uninjured. The weight of the metal was afterwards gradually increased to nearly 90 lbs. with safety. Mr. Clay, the managing partner, who has devoted much time and thought to the manufacture of gun metal, has attained complete success."

The Atlantic Telegraph Scheme.—By recent arrivals, we learn that the directors have abandoned their former plans, and have decided to raise £20,000 on a mortgage of the old cable, to be expended in the endeavor to take up and restore to working order the injured portions of the cable lying respectively off the Irish and Newfoundland coasts. Recent investigations encourage the hope of success, provided the weather be propitious. Operations will be commenced at Newfoundland, it being believed that the fault exists within three or four miles from that coast, and that the expense there will not exceed a sum of £2,000, which would be amply covered by the recovery of even a portion of the cable. The second fault is believed to be situated at a distance of not more that 180 or 200 miles (length of cable) from Valencia, instead of 270 miles, as previously supposed. The actual distance from the shore to the point in question is presumed to be only about 160 miles. It is proposed to manufacture a new cable about 100 miles long, and to splice it on the part where the main fault exists, previously ascertaining that a perfect communication exists with the shore. Even should the expedition not succeed with its main object of making the cable speak again, a large quantity of the old cable may be recovered. In the event of failure, the cable will be sold.

Extracting the Coloring Matter from Ocher.—*Le Génie Industriel* says that the coloring matter contained in ocherous earths may be extracted in the following manner:—The earths are baked in a furnace so constructed that it may be closed hermetically, or in boxes made of plates of iron, in which case, the boxes must be so fashioned that they may be hermetically sealed. The product is then washed to separate it from all foreign substances. In this way a coloring matter is obtained of which it is easy to vary the shades at pleasure, and which is suitable for painting buildings, coaches, &c.

INDUSTRY—MANUFACTURES—COMMERCE.

Commerce of New York.—The foreign imports at this port, for last month, were larger than for any previous March in the history of the trade. The receipts of free goods have been unusually large, showing an increase of over $1,000,000 upon the corresponding total in either of the previous three years:—

	1858.	1859.	1860.
Entered for consumption	$7,245,526	$15,314,023	$16,163,698
Entered for warehousing	1,812,230	2,804,413	3,592,693
Free goods	2,394,743	2,620,354	3,739,241
Specie and bullion	227,303	81,666	85,094
Total entered at the port	$11,729,702	$20,820,456	$23,580,126
Withdrawn from warehouse.	4,444,415	1,718,237	2,200,117

The imports for the last three months show an increase of $5,500,000 upon the first three months of 1859, and are more than twice as large as for the same period of 1858, as will appear from the annexed comparison:—

	1858.	1859.	1860.
Entered for consumption	$17,255,799	$46,102,196	$47,151,912
Entered for warehousing	5,052,301	5,270,622	7,863,276
Free goods	5,909,530	7,498,796	9,174,271
Specie and bullion	826,834	245,174	503,319
Total entered at the port	$29,044,464	$59,116,788	$64,692,778
Withdrawn from warehouse.	13,682,712	5,974,505	7,502,790

The entries for warehousing during the past month show a slight increase over the withdrawals, but the total stock is not yet as large as on the 1st of January. We have compiled a comparative summary of the foreign imports at this port since the commencement of the fiscal year:—

	1858.	1859.	1860.
Six months	$109,688,703	$91,082,463	$116,000,642
January	8,105,719	19,447,962	21,756,273
February	9,239,043	18,848,370	19,356,379
March	11,729,702	20,820,456	23,580,126
Total for nine months	$138,733,166	$150,199,221	$180,693,420

This shows the largest total ever landed here during the first three quarters of the fiscal year.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

STREET-SWEEPING MACHINE.

This invention consists in a novel mode of hanging the sweeping brooms, or broom cylinder, so that it will receive a direct rotary motion from the rear driving wheel or wheels, and in bringing the cylinder shaft in such a relation to the driving gear of the rear wheel by suitable arms and connecting rods, that said cylinder may be elevated or depressed while the machine is in motion; and in connection with this mode of hanging the broom cylinder, the invention also consists in applying to a hand lever for raising or depressing the broom cylinder, suitable springs arranged in such a way that the cylinder will be yielding to the inequalities of the street surface; also in a swinging box or trap arranged in the rear of the main broom cylinder for receiving the dust escaping from the said cylinder. Also in arranging in front of the broom cylinders, and in a suitable relation to a curved trough under the secondary broom clinder, a suitable receptacle for receiving and holding the dirt from the brooms, from which receptacle the dirt is to be readily discharged at intervals by a novel arrangement; also in a novel device for securing the broom heads to their shafts, and lastly, in arranging a guard board between the front and rear broom cylinders for the purpose of preventing dirt and dust from returning back upon the main broom. The credit of this contrivance is due to R. A. Smith, of No. 200 West 29th-street, this city.

CARPET-CLEANING MACHINE.

This invention combines with a rotary or vibratory beater or beaters, blast and suction pipes suitably arranged with relation to said beaters, whereby the dust is beaten out of the carpet and drawn away and conducted to any convenient place. The invention further consists in a novel arrangement of elastic beaters or whips having a rapid and continuous rotary motion, by which a more uniform beating action is given to the carpet than with the ordinary vibrating whips, and the parts occupy much less space, and perform their work with greater efficiency and less power than these of the present construction. The inventors of this improvement are A. Cutler and E. S. Wright, of this city.

CORN HUSKING MACHINE.

This invention has for its object the stripping of the husks from the ears of corn in a perfect manner, with a very simply and cheap machine. The invention consists in the employment of two rollers placed one above the other in the same axial plane, the larger one of which is grooved serrated or roughened longitudinally for stripping the husk from the cob, combined with which is a vibrating curved apron, made suitably yielding and furnished with one or more rollers projecting from its inner surface which allows the ears of corn to turn freely and present their husks to the "bite" of the rollers which forcibly tear the husk from the ears, from the tops to the butts thereof. This improvement was designed by N. T. Spear, of 116 Nassau-street, this city.

MOLE PLOW.

This invention relates to improvements in that class of ditching machines known as mole plows, it is used to drain of swamps and low lands. The drains are found by cutting channels in the ground, from one to two, or more feet in depth, all leading to one common conduct or channel. In using these mole plows, it is frequently necessary to draw the plow out of the ground and as it may be sunk pretty deep in wet and tough boggy mud, it is found to be a very difficult operation. The object of this invention is to construct the machine in such a way that the standard for carrying the tooth or shoe may be adjusted logitudinally with the beam of the machine. This adjustment given to the standard will be useful for regulating the direction of the point of the plow for

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forming the drain without the necessity of drawing the plow out of the earth to set it. This device has been patented to A. Hammond, of Jacksonville, Ill.

MACHINE BELTING.

This invention consists in the employment of a belt the section of which would be trapezoidal, or of a shape nearly resembling this figure, in connection with an angular grooved pulley, whereby a much greater surface of the belt is brought in contact with the sides of the pulley groove than with either the round or flat belts; and whereby the belt will wedge itself into the groove and resist any slipping action during the rotation of the pulleys so that the greater the strain put upon one side of the pulley the tighter will the belt be held in the groove. The patentee of this invention is Henry Underwood, of No. 210 Eldridge-street, this city.

SUGAR CANE MILL.

This invention consist in the employment of a large or main cylinder in connection with a series of small ones; the former having its journal fitted in permanent bearing, and the latter having their journals fitted in adjustable segment bars. The invention also consists in the employment of feed tubes, and an apron to receive the juice, and also in certain means to insure the proper passage of the cane through the mill. The object of the invention is to express the juice from the cane in a much more efficient manner than usual, by repeating the pressing or squeezing operation a suitable number of times as the cane passes through the mill, and also to control, during the operation, the escape of the juice, and consequently prevent the waste of the same. Eugene Powell, of Conneautville, Pa., is the inventor.

BOILER-FEEDER.

This invention consists in arranging, in an air-tight water-box, which communicates with a well or tank, a piston with three heads, working in a cylinder which is permanently secured in and surrounded by a steam-jacket, and which is perforated with holes in such a manner that one of the compartments formed by said piston heads, in the interior of the cylinder, receives water, while the other discharges its contents into the boiler if the water in the same is below the desired level, and at the same time the water displaced by the piston is supplied from the well or tank by the action of the said piston. This device is so constructed that its effect is certain, and that it needs no attention after it has once been properly adjusted; and by its use, the pump can be dispensed with. A patent was obtained for this invention by Messrs. C. & G. M. Woodward, of No. 77 Beekman-street, this city, and the patentees will be happy to give any further information in regard to it.

SECURING HANDLES TO CUTLERY.

The object of this invention is to dispense with the use of cement in attaching handles to cutlery and other implements and thereby avoid the liability of the loosening of the tangs in the handles when immersed in warm water for the purpose of washing. The invention also has for its object the ready and cheap attachment of the handles to the cutlery or tools. The invention consists in providing the cutlery or tools with flat tangs, drilled transversely near their outer ends, or provided with projection, and fitted in longitudinal holes in the handles, the latter being bored entirely through transversely, so as to intersect the lower parts of the longitudinal holes; the holes, when the tangs are fitted in the handles, being filled with melted metal, which, when cool, firmly secures the handles to the tangs. The credit of this contrivance is due to R. H. Fisher, of Beverly, N. J.

STEERING APPARATUS.

This invention consists in the employment of one or more columns of water or other non-compressible liquid for the purpose of transmitting the motion of the steering wheel to the rudder, and it consists also in arranging the wheel on a screw shaft connecting with a piston that moves in an air or water tight cylinder, the ends of which connect by suitable tubes with two barrels furnished with plungers that connect with the arms of the tiller in such a manner that when said cylinder is filled with water or some other non-compressible liquid, the motion of the wheel in one direction or in the other is transmitted to the rudder, no matter how far the distance between the wheel and rudder may be. The inventor of this device is W. W. Huse, of Brooklyn, N. Y.

CARBONIC ACID GAS APPARATUS.

This invention consists in an apparatus for obtaining carbonic acid gas in any required quantity at such uniformly regulated pressure as may be desired, by the mixture of suitable chemical matters, and for employing the pressure of such gas to pump water, into a receiver or cooler in which it is charged with the gas and from which it may be supplied to a fountain for use or drawn off into bottles. The inventor of this improvement is Samuel Chamberlaine M.D., of Philadelphia, Pa.

MOLDING GLASS.

The object of this invention is to overcome the difficulty attending the shrinking of the glass in cooling in the molds, said shrinking hitherto causing the articles cast or molded to be imperfect in form and without that sharp angularity so necessary to a chaste and ornamental appearance. The invention consists in subjecting the melted glass while in the mold, to two pressures, one succeeding the other, the latter pressure being given during the cooling of the glass, so as to fully compensate for the shrinking of the same. This improvement was designed by Charles H. Warner, of Brooklyn, N. Y.

BLACK VARNISH.

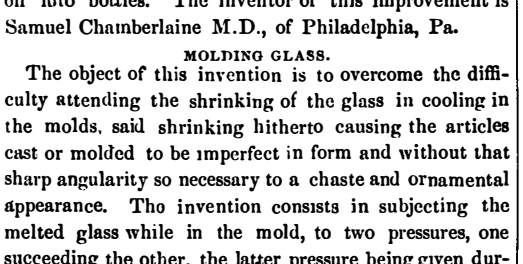
André Sabatier, of this city has a new black varnish, composed of alcohol, spirits of turpentine, alkanet, sulphate of iron, gum benzoin, gum sandarac, and lampblack. It is suitable for boots and shoes, military furniture and other articles of leather, drying very quickly, and with a fine luster.

THE PATENT BILL—MORSE'S EXTENSION CASE.

It will be seen by reference to our Washington letter, that the writer speaks somewhat despondingly in relation to the success of the Patent Bill. It appears, however, from the report of the transactions in the Senate, that, since that letter was written, the chairman of the committee undertook to get the bill up for consideration; Senator Hale, objecting, called for the *ayes* and *nays* on the motion, and there were nineteen senators in favor of the motion and nineteen against it. In this dilemma, the bill received its *quietus* by the casting vote of the Vice President of the United States—the Hon. John C. Breckinridge. We much regret that the Vice President (from whom we expected better things), when he had it in his power, did not show his devotion to one of the noblest institutions of our country. Judging from appearances, we are much afraid that the Patent Office has but few friends in the Senate.

The Washington letter referred to also presents an account of the Morse telegraph extension case. The Commissioner of Patents has since decided to extend that patent, which is probably one of the most important, in its bearings on the telegraphic interests of the country, that has ever been issued. Professor Morse owes this extension, in a great measure, to the thoroughly able manner in which it has been conducted. We congratulate him on his good fortune, and trust that he may ever

"Sleep with soft content about his head,
And never wake but to a joyful morning."



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 10, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

27,765.—James Aldrich, of Washington, D. C., for an Improvement in Water Elevators:

I claim the mechanical arrangement of the pulleys, e1 e2, the sliding bolt, f, and spring, t, the rope, g, the guide, h, and socket, s, the rods, l l, and guides, r r, or their equivalents, for the purposes set forth.

27,766.—C. Atkinson, of Vermont, Ill., for an Improvement in Seeding Plows:

I claim, first, The arrangement of the double moldboard share, F, coulters, G, subsoil share, e*, and a suitable seed-distributing device, for joint operation, as set forth.

Second, The supporting of the implement by the wheels, B B l l, when arranged with the beam, D, axle, A, and bar, E, substantially as shown, to graduate the depth of the cut of the shares, as specified.

[The object of this invention is to obtain an implement for planting seed, and at the same time for preparing the ground in a more proper state than usual to receive the seed and favor its rapid germination and growth. The invention consists in an arrangement of rotary cutters, double moldboard share, subsoil share and seed-distributing device, whereby the desired result is obtained.]

27,767.—Luther Atwood, of New York City, for an Improvement in the Distillation of Hydro-carbon Oils:

I claim the use of steam in preparing a hot still for the safe admission of a charge of oil, substantially as described.

27,768.—Luther Atwood, of New York City, for an Improvement in Apparatuses for the Distillation of Coal Oils:

I claim, first, A volatile oil still, capable of being heated at the sides, and constructed with a removable lower section, consisting of the bottom and a short section of the side, substantially as described, and substantially for the purposes set forth.

Second, The combination of a weighted safety valve with a volatile oil still, constructed substantially as described, and so arranged as to relieve the still from pressure when the condenser becomes choked.

Third, The steam pipe and valve, O, safety valve, N, and closed angle valve, L', when used in combination with a still and steam boiler, the whole substantially as described.

Fourth, The steam pipe and valve, P, and angle valve, L', when used in combination with the condenser and a steam boiler, substantially as described, and substantially for the purposes set forth.

Fifth, The use, in combination, of two or more manholes in the top or cover of the still, substantially as described, and substantially for the purposes set forth.

Sixth, The use of the main, N4, in combination with the safety valve, substantially as described, and substantially for the purposes set forth.

Seventh, The described mode, substantially, of setting a still so that the lower section can be removed without disturbing the main body of the still.

27,769.—John Avery, Jr., of New York City, for an Improved Steam Trap Valve:

I claim the combination of an expansible tube, an elastic or self-yielding adjustable valve and a condensing chamber, substantially in the manner and for the purpose set forth.

27,770.—John M. Batchelder, of Cambridge, Mass., for an Improvement in Compounds for Insulating Telegraph Wires:

I claim a telegraph wire, or other conductor of electricity, insulated with a compound substance, composed of pulverized silex, glass, or other non-conducting material, mixed with india-rubber and sulphur and subsequently vulcanized, substantially as described.

27,771.—Lorenzo Beach, of Montrose, Pa., for an Improvement in Horse Rakes:

I claim the arrangement of the teeth arms, c, the pivot pins, w, blocks, a, semi-circular rests, t, lever, s d, handles, h, and balance, k, as described, and for the purpose specified.

27,772.—Geo. W. Bigelow, of New Haven, Conn., for an Improved Burglar's Alarm:

I claim the arrangement of the pivoted jaws, A B, with the tapering ends, f g, and with the hammer, c, and nipple, d, in combination with the spring, C, constructed and operating substantially as and for the purpose described.

[This invention consists in arranging two pivoted jaws, in combination with a spring, in such relation to each other that the tapering end of one of the jaws can be depressed into a slot in the end of the other jaw, and that both together, when thus compressed, can be inserted into the crack of a door or window up to a shoulder which projects from one of said jaws, so that, when the door or window is opened, one of the jaws strikes against a nipple attached to the other jaw, and that, by the explosion of a cap placed on said nipple, the inmates of the house are aroused.]

27,773.—Sewall Brackett, of Fall River, Mass., for an Improved Knife and Fork-cleaner:

I claim the combination and arrangement of the securing rollers, B and C, the gears, D, the saddle, F, the rods, I, the springs, d, cases, A and E, all substantially as and for the purposes specified.

27,774.—F. Chamberlin, of Berlin, Wis., for an Improvement in Seeding Machines:

I claim, first, The arrangement of the dragging seed troughs, P P P, hinged and held in position by means of springs, S S S, when the same are used in connection with the seed sprouts, a a a, and seeding cylinder, C, substantially as and for the purpose specified.

Second, The combination of the seeding cylinder, C, provided with cups, as set forth, with the hopper, A' and A, and box, D, provided with seed spouts and with a hinged cover, F, for drilling or seeding broadcast, substantially as specified.

27,775.—Samuel Chamberlaine, of Philadelphia, Pa., for an Improvement in Apparatuses for Generating Gases:

I claim, first, Combining the two vessels, A and B, which contain the gas-making ingredients, by means of a siphon, C, substantially as described, so that, when a reduction of pressure is produced in the generating vessel by permitting the escape of gas or air therefrom, the acid or other liquid from the other vessel will be caused to flow over into the generating vessel by the difference of pressure.

Second, The arrangement, in combination with the two vessels, A and B, and their connecting siphon, c, of the two three-way-cocks, or their equivalents, E and G, in the outlets of such vessels, the connecting pipe, h, between the said cocks, or equivalents, and the piston, H, geared with said cocks, or equivalents, whereby, when the pressure in the generating vessel reaches a certain degree, the gas is caused to flow back to the other vessel, and so prevent more acid or other liquid coming over from the latter vessel, and when a further increase of pressure takes place providing for the escape of gas to the atmosphere, substantially as described.

Third, The pumping apparatus, consisting of the cylinder, M, with its partition, i, two connected pistons, K K', passages and double four-way-cock, L, applied substantially as described, in combination with the generating apparatus and the receiver or cooler, O, to deliver gas and water simultaneously into the receiver and cooler at a uniform pressure.

27,776.—John G. Christopher, of Byron, Ill., for an Improvement in Cultivators:

I claim, in combination with the plows, C C D, the adjustable bar, p, provided with the roller, t, and arranged to permit of the adjustment, as shown, for the purpose set forth.

[The object of this invention is to obtain a cultivator that may be rendered capable of performing various kinds of work, as may be required, and by a very simple adjustment of parts. The invention consists in the employment or use of plows of peculiar construction, arranged or applied to a frame in connection with an adjustable supporting wheel, whereby one or three plows may be used, and the plows adjusted at a greater or less distance apart, as the nature of the work may require.]

27,777.—John Cockburn, of New York City, for an Improved Pen and Pencil Case:

I claim the combination of the spirally-slotted tube, D, extension tube, B, the longitudinally slotted tubes, b c, and the tube, E, with the pencil slide, F, and pen slide, G; the pencil slide, F, pen slide, G, and the tube, D, being provided respectively with pins, m i l, which fit in the slots, g c d, of the tubes, D C, and all arranged relatively with each other and the case, A, as and for the purpose specified.

[The object of this invention is to obtain a pen and pencil case that may be closed within a small compass to admit of being readily carried in the pocket, and still be extended sufficiently when required to form a handle of requisite length for convenient use. The invention consists in combining with an ordinary spirally-slotted tube for operating the pencil tube, an extension tube and pen slide, all arranged relatively with each other and fitted within a shell or external case to effect the desired end.]

27,778.—Calvin Cox, of Coxville, N. C., for an improvement in Breech-loading Fire-arms:

I claim dividing the barrel transversely at such a point that part of the bore which receives the charge shall be a fixture with the breech, in combination with the manner of hinging the barrel, and producing a close lock joint between the same and breech, substantially as and for the purposes set forth.

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27,779.—Pearson Crosby, of New York City, for an Improvement in Saws:

I claim making saws with the teeth of the form substantially as described, that is to say, with the two angles on the upper edge and with the sides of the teeth, after being set, brought to a plane on each side, parallel with the face of the saw, substantially as described; but this I only claim in combination with the slitting teeth made of greater length than the cutting away teeth, and beveled laterally and alternately on opposite sides, substantially as and for the purpose specified.

27,780.—A. Cutler and E. S. Wright, of New York City, for an Improved Carpet-beater and Cleaner:

We claim, first, The employment of the parabolic spring beaters, a', when the same are elastic throughout their entire lengths, and are arranged upon a driving shaft, E, substantially as shown and described, for the purpose set forth.

The arrangement and combination of the blast spouts, M N, and beaters, a', as shown and described.

Third, The arrangement and combination of the rollers, B, endless bands, a, boxes, D D', beaters, a', spouts, M N, suction pipe, J, fan boxes, G G', fans, H H', and discharge spout, K, as and for the purpose shown and described.

27,781.—Elliot Dickerman, of Richmond, Vt., for an Improved Clothes-wringer:

I claim the arrangement of rubber rollers, R R', rigid rollers, B B', and their respective shafts, with the slotted frame, F, as described, whereby the entire elasticity of the rubber rollers is rendered available for the desired purpose.

27,782.—Lovett Eames, of Kalamazoo, Mich., for an proved Mortising Tool:

I claim, in combination with the parallel lip, d, on the side of the auger cap, the hollow conical mouthed and scolloped chisel point, whereby a hole, the full width of the chisel, may be bored by the auger, and the cuttings made by the auger will be directed towards the center of the auger, as described.

[This invention consists in the use of a hollow chisel with three, four or more sides, with either regular or irregular sides or angles, through which is passed an auger with a single twist, having on its end a detachable steel cap with one or more face or radial cutting lips and on its side a parallel cutting lip or lips, the throats of which communicate with the worm or spiral groove of the auger, which groove directs or conducts the chips to the rear or back end of the auger, where they are discharged. Here, the point of invention consists in combining with the cutting lips a scolloped and flaring mouthed chisel, the inner surfaces of which mouth are beveled towards the axis of motion of the auger, whereby the chisel may be driven into the work with greater ease and rapidity, and the chisel will have a firmer hold on the work in the commencement of boring. The edges of the side cutters can also be brought nearer or in a plane with the sides of the auger, and the chisel will have less work to perform. The cap on the end of the auger is to be made of hardened steel and attached to the end of the auger in such a manner that it may be readily attached or detached, or so that it may be permanently secured to the auger when a forward and reverse motion of the auger is required.]

27,783.—Seth W. Eells, of Mansfield, Ohio, for an Improvement in Apparatuses for Evaporating Sugar Juices:

I claim the evaporating pan for boiling thick sirup and graining sugar; such pan being placed in another pan or vat containing fluid, substantially as described, that the danger of burning or over heating the graining sugar may be obviated.

I also claim the application of the principle of using tubes in the boiler, substantially as described, to increase the heating surface for evaporating cane juice, thereby expediting the process and economizing space.

I also claim the application of this principle to the purpose of evaporating cane juice or sugar, substantially as described.

27,784.—James E. Emerson, of San Francisco, Cal., for an Improvement in Fastenings for Ax Handles:

I claim the employment of the lips, a a, in combination with the ax, A, head, e, key, c, and wedge, d, when the said lips constitute a part of the ax, and are made flush therewith, all as shown and described.

[The object of this invention is to attach picks, axes and other similar large and heavy tools to their handles without having an eye made through them as hitherto to receive the handles, thereby avoiding the loosening of the handle by the shrinking of the same, they being of wood, and also avoiding the weakening of the tools in consequence of having the eyes made through them. The invention also admits of the use of an ax handle for several tools.]

27,785.—James E. Emerson, of San Francisco, Cal., for an Improvement in Lubricating Carriage Axles:

I claim supplying the oil to the axle through the bottom of a tube, A, or that end nearest the axle, by means of a screw cap, valve stem and valve, arranged and operating essentially as set forth and for the purposes described.

[This invention provides for supplying the axle with oil whenever necessary, either on the road or in the carriage-house; and by simply moving a thumbscrew, a free supply of fresh and pure oil may be supplied to the axle, at the same time the impure oil on the axle cannot enter the feeding box. For this purpose, the invention consists in the employment of a suitable oil receptacle with a peculiar valve stem and valve, with a screw cap, arranged in such a way, and introduced through the hub and axle box, as to be free from injury, and so as not to be affected by the wear of the axle box.]

27,786.—Ormrod C. Evans, of New York City, for an Improvement in Steam Engines:

I claim the cam, B, the rule joints, A A1 A2 A3, bridles, F F, arms, e e, springs, s s, and compound lever, c, in combination, constructed and arranged substantially as described, and for the purpose set forth and shown in the drawings.

27,787.—John M. Farman, of Hartford, Conn., for an Improved Knife-sharpener and Cleaner:

I claim, first, The arrangement of the polishing plates, B C, to be used in the manner and for the purpose described, substantially as set forth.

Second, The arrangement of attaching the knife-sharpening plates, G G', to the plate, C, to be used for the purpose described, substantially as set forth.

Third, I claim the gate, E, constructed and combined with the hoppers, D D', as and for the purpose specified.

Fourth, I claim the combination of the polishing plates, B C, the hoppers, D D', with the sharpening plates, G G', and spiral springs, b b', constructed and arranged as and for the purpose specified.

27,788.—Geo. H. Fayman, of Washington, D. C., for an Improvement in Butt Hinges:

I claim a loose butt hinge with a changeable axis to adapt it to being used on the right or left hand.

27,789.—Wm. Finlay, of Schoolcraft, Mich., for an Improvement in Seeding Harrows:

I claim the wheel, H, arms, N, bars, K K, and connecting rod, M, with the lever, M', in combination with the seed hopper, G, when the same are arranged and combined with the front adjustment of the revolving harrow frame set forth, for the purposes specified.

[This invention consists in arranging two parallel bars on the frame of the machine properly braced and supported, and placed at a suitable distance apart from the hopper. On these bars the hopper is to be secured and operated with an alternate reciprocating motion, by a suitable lever placed near the driver's seat; the object of which movement is to throw into or out of gear, with a traction wheel, a vibrating arm which operates the seed-distributing cylinder. The invention further consists in a novel mode of hanging the draft pole to the frame of the machine, whereby the front end of the frame may be elevated or depressed by the driver, for turning the machine and for raising the traction wheel from the ground.]

27,790.—R. H. Fisher, of Beverly, N. J., for an Improvement in Securing Handles of Cutlery:

I claim the described method of attaching handles to cutlery and other implements, to wit: having a flat tang, B, with a barb, a, fitted within a hole, b, the mouth of which is sealed by the bolster, c, and then introducing melted metal within the handle through the hole, d, so as to surround and hold the tang, all as set forth.

27,791.—Geo. P. Foster, of Providence, R. I., for an Improvement in Cartridge Cases:

I claim the improved cartridge case, as made with the grease chamber arranged within it and in its head, as specified.

27,792.—Thomas Fry, of Brooklyn, N. Y., for an Improved Chair Caster:

I claim the combination and arrangement of the stock, c, the base, F, the spring, B, with the wheel, D D, substantially as and for the purpose specified.

27,793.—Adoniram J. Fullam, of Springfield, Vt., for an Improvement in Punches:

I claim an improved punch, as made with its side faces curved relatively to the stamping or end face of it, substantially as described.

27,794.—Rollin Germain, of Buffalo, N. Y., for an Improved Paddle Wheel:

I claim the construction of a paddle wheel for vessels for navigation, wherein the paddles are made and hung, substantially as set forth, in combination with a spring or springs placed upon the wheels, and so connecting with and acting upon the paddles as to hold them edgewise in the line of motion while passing through the atmosphere, and cause them to enter the water edgewise and allow them to glance or turn in the water (by the action of the water thereon) to a position transverse to the rims of the wheel, for the purposes and substantially as described.

27,795.—Charles S. Graves, of Elyria, Ohio, for an Improvement in Horse-powers:

I claim the combination of the lever to be vibrated with the scolloped or corrugated edge of the driving wheel, substantially as set forth.

27,796.—A. Hammond, of Jacksonville, Ill., for an Improvement in Plows:

I claim the combination with the standard, D, of the movable plate, J, adjusting set screw, L, and friction rollers, G G, arranged as set forth, so as to regulate the depth for forming the drain, and at the same time to facilitate the removal of the shoe from the ground.

27,797.—Heman B. Hammon, of Bristolville, Ohio, for an Improvement in Cultivator Teeth:

I claim the employment of the grooved plate, C, in combination with a frame, A, and reversible arm, B, having a projection, a, as and for the purpose shown and described.

27,798.—Charles T. Harris, of New Brunswick, N. J., for an Improvement in Vulcanizing Caoutchouc:

I claim the means, substantially as described, of curing india-rubber and analogous gums, by combining them with an artificial sulphide of bismuth and heating the compound.

27,799.—D. S. Harris, of Galena, Ill., for an Improved Spark-extinguisher for Steam Boilers:

I claim the wire screens, D, and troughs, E, placed within the lower parts of the smoke pipes, B, in connection with proper water supply tubes, F G, and discharge tubes, a, substantially as and for the purpose set forth.

I further claim, in connection with the wire screens, D, and troughs, E, and water supply pipes, the scrapers, H, as and for the purpose set forth.

[This invention consists in the employment or use of a wire screen, water trough and water supply and discharge pipes, and also scrapers arranged and placed within the smoke pipe of a furnace, so that the smoke and gaseous products of combustion will be allowed to readily escape and pass up the smoke pipe, while the sparks will be arrested, extinguished and discharged from the lower part of the smoke pipe.]

27,800.—Edward Hatfield, of Brownsville, Pa., for an Improvement in Washboards:

I claim, as a new article of manufacture, a washboard with a rubber of pottery.

27,801.—Joseph Higginbotham, of Philadelphia, Pa., for an Improvement in Stop Valves:

I claim the guide, D, with its slot, m, the cup, C, and spindle, B, with its two slots crossing each other, in combination with the spindle, H, and its cam, G, when a part of said guide forms, in conjunction with the cap, C, a stuffing-box for the spindle, B; and when the several parts are arranged in respect to each other and to the body of the valve, substantially as specified.

27,802.—Andrew Hills, of Naugatuck, Conn., for an Improved Culinary Fork and Spoon:

I claim the double ladle, C C, tongue and eye, E E', springs, G G, handle, B, and fork, J, when the same are constructed and arranged as represented and described—constituting a new article of manufacture.

[This invention consists in combining two ladles or spoon-shaped tongs with a fork, and in constructing them of two pieces of suitable steel wire bent up in a novel manner, and attached to a handle in such a manner that strength and elasticity are suitably combined, a guide and tongue are formed for preventing lateral movement of the ladle arms, and the utensil is formed in a complete, light and exceedingly cheap manner, so as to be handy and convenient in the culinary department.]

27,803.—Ansel Howard, of Readsborough, Vt., for an Improved Machine for Making Wooden Ware:

I claim the arrangement and combination of the two curved guides, L L, and a shaft, K, applied, as described, to a vertically-moving frame, supporting cutters applied to it, substantially as specified.

I also claim the mechanism for rounding the external surface of the block or tray, or preparing such with a flat bottom and round sides and ends; the said mechanism consisting of the plane, the curved guide grooves and switches, arranged so as to operate substantially as specified.

27,804.—David Howell, of Louisville, Ky., for an Improved Trip Hammer:

I claim the arrangement of the sliding conical cam, F, feathered shaft, E, sliding clutch, G, rod, H, and hammer, C, when the parts are constructed, combined and adapted in the manner set forth, to admit of varying the stroke of the hammer while in operation.

27,805.—Joseph Charles Howells, of Madison, Wis., for an Improvement in Needle Guards:

I claim, as a new article of manufacture, the combination of the needle guard, A, and hemmer, B, whether the stitching gage or knife be used therewith, or not, substantially as set forth for the purpose specified.

27,806.—Henry Charles Howells, of New York City, for an Improvement in Head-supporting Apparatus for Travelers:

I claim the above-described head rest, as a new article of manufacture, substantially as specified.

27,807.—Martin A. Howell, Jr., of Ottawa, Ill., for an Improvement in Corn Planters:

I claim, first, The employment or use of rocking seed cups, E E, placed within or above the seed boxes, D D, and provided with seed cells, f, and flaps or valves, h, or their equivalents, to operate as and for the purpose set forth.

Second, In combination with the rocking seed cups, E E, and seed boxes, D D, the slides or cut-offs, G, operated from the rocking cups, E E, substantially as and for the purpose set forth.

[This invention relates, 1st. To an improved means for covering the seed or depositing the same in the earth, whereby the seed may be planted at a uniform depth, all irregularities of the depth of the furrow being compensated for. The invention relates, 2d. To a novel seed-dropping device whereby the seed may be dropped evenly or uniformly and without the liability of the device used for the purpose becoming choked or clogged; the device also working with but little friction, and without the liability of being deranged by use, or its perfect operation affected by wear and tear.]

27,808.—Wm. D. Ivey, of Milford, Ga., for an Improvement in Plows:

I claim the combination and arrangement of the guard blade, I, the wheel, G, plow, D, frame, E, and draft beam, A, substantially as set forth.

57,809.—Josee Johnson, of New York City, for an Improved Washing Machine:

I claim the combination and arrangement of an inclined washboard, A, with the revolving disk, E, which is parallel to, and capable of sliding towards and from A, by the action of the same hand which operates it, substantially as and for the purposes set forth.

27,810,—Mathaus Kaefer, of New York City, for an Improvement in Chucks for Cutting Disks of Paper, &c.:

I claim the hollow cutter, b, arranged with screw threads around its outer surface, all substantially as set forth.

27,811.—Joseph Keech, of Waterloo, N. Y., for an Improved Washboard:

I claim the obtuse angular shape given to the crimp or corrugations, longitudinally, constructed, arranged and operating substantially as and for the purposes set forth.

27,812.—John E. Kelly, of New York City, for an Improvement in Mangers:

I claim the movable bottom to mangers and feed boxes, supported in such manner that they may be depressed to receive the given quantity of feed, and are raised and kept to the rack or bars by means of springs or weights, or their equivalents, in combination with a feeding rack made horizontal or nearly so, in the manner described, and for the purposes specified.

27,813.—Leonard Kile, of Williamsfield, Ohio, for an Improvement in Upsetting Tire:

I claim the employment of the wedges, C D E F, in combination with the concave-faced anvil, A, as and for the purpose shown and described.

27,814.—Marcus Laveen, of Moorefield, Va., for an Improved Fly Brush or Fan:

I claim the arrangement of a ratchet wheel, B', vibrating lever, G, notched wheel, K, fly wheel, O, two spiral springs, F P, and one or more fans, A A, for the purpose of imparting a vibratory motion to the fan or fans, and thus creating an artificial motion of the air, substantially as set forth.

27,815.—John K. Lemon, of Toledo, Ohio, for an Improvement in Builders' Scaffolds:

I claim the employment of the slotted wedge blocks, D, in combination with bands, C, pins, b, and uprights, A, as and for the purpose shown and described.

[This invention consists in an improved mode of attaching or securing the blocks which support the putlogs of the scaffold to the uprights, whereby said blocks may be readily adjusted and secured to the uprights at any desired point, and the scaffold erected with facility, increased in hight, as desired, and readily taken down.]

27,816.—David C. Lyall, of New York City, for an Improvement in Supporting Window-sashes:

I claim the arrangement and use of the lever or bar, m, slitted bearings, s s, on both sides of the sash, straight flat spring, v, in combination with the triplet crank, c c c', as applied to operating window-sashes, substantially as described and shown in the drawings.

27,817.—Thomas J. Mayall, of Roxbury, Mass., for an Improvement in Substitutes for Emery Cloth:

I claim the new article of manufacture, as a substitute for emery cloth, emery paper or sand paper; the same consisting of a sheet of india-rubber or gutta-percha, of any desired thickness, with which emery or sand is incorporated and combined, cemented to a sheet of cloth or paper, or other backing, and subjected to heat, substantially as described, for the purpose of polishing, sharpening, or other similar purposes.

27,818.—Thomas J. Mayall, of Roxbury, Mass., for an Improved Artificial Slate:

I claim, as an article of manufacture, a slate produced in the manner described, by combining, in one piece and without seam or joint, the frame made of soft or elastic rubber or gutta-percha, and the tablet formed of rubber or gutta-percha with which emery or sand, or other gritty material is incorporated, and constituting a comparatively-hard and rigid substance, as set forth.

27,819.—Charles McBurney, of Roxbury, Mass., for an Improvement in Hose Tubing:

I claim a hose for conveying liquids, having a woven fibrous exterior and a vulcanized india-rubber interior, with an interposed layer of unsulphured rubber, as set forth for the purpose specified.

27,820.—George B. Mickle and J. M. Carville, of New York City, for an Improved Truck for Fire Ladders:

We claim, first, The arrangement of the sockets, f, at the two parts, B C, of the truck, in combination with the perch, D, constructed and operating substantially as and for the purpose described.

Second, The arrangement of the loops, h, and sockets, i, on the wheels of the front part of the truck, to operate in combination with the crowbars, E, substantially in the manner and for the purpose specified.

27,821.—George B. Mickle and J. M. Carville, of New York City, for an Improved Extension Ladder:

We claim, in combination with the drums, D E, on the shaft, a', the ladders, A B C, sliding strips, e, and stops, f f, substantially in the manner and for the purpose specified.

[An engraving and description of the two preceding inventions (combined) will be found on another page.]

27,822.—Isaac Mott, of Glenn's Falls, N. Y., for an Improvement in Laying Slate Roof:

I claim the peculiar method described and shown of laying rectangular slate on the roofs of houses, &c., for the purposes set forth.

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27,823.—David Needham, of Oskaloosa, Iowa, for an Improvement in Tanning:

I claim the described process of tanning, consisting in the application to the hides of a solution composed of the specified materials, mixed in about the proportion specified, preparatory to treating them with the tanning liquid.

[This invention consists in applying to the hides a peculiar composition of matter, for the purpose of preparing them for the tanning liquor, and to produce a quick-tanned leather, which is not liable to crack, and which is equal, in every respect, to the leather tanned by the usual process.]

27,824.—Mortimer Nelson, of New York City, for an Improvement in Riding Saddles:

I claim the arrangement of the two springs, f, of rubber or equivalent material, the cross piece, e, and screw, d, in the manner and for the purposes specified.

27,825.—J. M. Patterson and J. F. Morell, of Woodbury, N. J., for an Improved Washing Machine:

We claim, first, The metallic, hollow, air-tight, corrugated cylinder, A, and the metallic concave and corrugated bottomed case or tub, B, the same being constructed and arranged together in the manner and for the purpose set forth and described.

Second, We also claim giving the semi-rotary oscillating motion to the cylinder, A, when the same is suspended over the concave, B, as described, by means of the levers, l l, cords, n n, pulleys, j j, hand levers, m m, and the springs, o o; the same being constructed and arranged in relation to each other on the machine, in the manner set forth and described.

27,826.—Jacob L. Paxson, of Norristown, Pa., for an Improvement in Harvesters:

I claim the combination of the forked lever, Q, and yokes, R R, with shaft, B, and the cutting apparatus; the parts being constructed, arranged and operated in the manner and for the purpose specified.

Also, the peculiar manner of connecting the platform frame with the main frame (which is supported by the wheels, C, D), by the bars, L L, and bolts, h, i; the parts being arranged and connected in the manner and for the purpose substantially as set forth.

27,827.—Wm. H. Pease, of Goshen, Ind., for an Improved Machine for Carving Marble, &c.:

I claim the levers, g, h, n, arranged as shown, to form the lazy tongs provided within the joint, D, and the arbors, H, G′, operated from the driving shaft by means of the gear and belts, substantially as and for the purposes set forth.

[This invention is chiefly designed for operating from patterns, and may be advantageously used for carving, lettering, or planing irregular or winding surfaces, and the like. The invention consists in the use of a system of levers known as lazy tongs, provided with an index and cutter so arranged as to effect the desired end.]

27,828.—John G. Perry, of South Kingston, R. I., for an Improved Sausage-stuffer:

I claim combining the plate or wheel, B, with the tube, H, substantially as described and for the purposes set forth.

27,829.—Salmon R. Plumb, of Southington, Conn., for an Improved Sausage-stuffer:

I claim the arrangement and combination of case, A, revolving right and left handed screw, B, and sliding plate, C, essentially in the manner and for the purposes fully set forth and described.

27,830.—Eugene Powell, of Conneautville, Pa., for an Improvement in Cane Presses:

I claim the combination with the basin, F, plates, E′ E′, cylinders, D′, and cylinder, B, of the curved plate, G, when provided with tubes, H, as and for the purpose shown and described.

27,831.—Carl Pretsch, of Trenton, N. J., for an Improved Reading and Writing Desk:

I claim the combination of the adjustable ledge, J, strip, E, and tablet, D, with the drawer, C, box, A, rack box, B, bracket, L, and adjustable rod, M, as and for the purpose shown and described.

[This invention is a portable reading and writing desk to be attached to the side of a bedstead rail, to a chair or other article of furniture, for the use of invalids or those who are not able to hold a book constantly while reading, or who are not able to get from the bed to use a table. The invention is especially intended for such persons; and it provides both for the reading and writing, viz.; by serving as an adjustable support or tablet for the book while it is open, and a tablet for writing on, while a drawer is provided for containing the writing materials. Every provision is made for placing the book while in use in a proper position, and for holding the leaves down while it is open. The parts can all be raised or depressed, and fixed in the desired position; and they may be readily removed, packed-up and laid away, when not in immediate use.]

27,832.—Lewis C. Reese, of Phillipsburgh, N. J., for an Improvement in Harvesters:

I claim, first, The combination of the arms, G, provived respectively with bars, I, and one or more rakes, I′, with swivels, d, connected by joints, c, to a rotating shaft, E, and by friction rollers, or other suitable means, to a guide, H, to operate as set forth.

Second, The employment or use, in connection with the guide, H, of the slotted arms, F, attached to the shaft, E, and arranged, as described, to receive the arms, G, and retain the same in a proper relative position with each other, and arranged for adjustment substantially as described.

[This invention consists in the use of a series of arms, constructed each with a swivel, and connected to a rotating shaft by means of joints, the above parts being used in connection with a curved guide and rotating arms; all the parts being so arranged as to cause the arms, as the shaft is rotated, to pass over the platform, in such a relative position therewith, and with the sickle, as to perform the functions of a reel and reaping device.]

27,833.—André Sabatier, of New York City, for an Improved Varnish:

I claim the varnish composed of the several ingredients specified, in about the proportions set forth.

27,834.—Jacob Schaeffer, of Henderson, Ky., for an Improvement in Grain Separators:

I claim having the rear end of the first chaff riddle attached to a revolving crank shaft, K, and its front end hinged to a suspended swinging frame, which contains a second chaff sieve and a grain sieve, substantially as and for the purposes set forth.

27,835.—L. K. Selden, of Haddam, Conn., for an Improved Child's Cradle:

I claim, first, A cradle body made of suitable strips jointed together, and capable of being folded up, as described and represented.

Second, The rockers, B B, composed of pieces, B′, arranged and applied so as to serve the two fold purposes of a brace and spring, as set forth.

[This invention consists in constructing a cradle in a novel manner, whereby it may be folded-up and packed away into a very compact space, and in a few minutes unfolded and set up ready for use. The parts may be made entirely of metal, so as to possess strength combined with lightness: and the cradle body is to be supported on spring rockers, which are detachable, and capable of folding-up with the body.]

27,836.—D. P. Sharp and L. Mood, of Ithaca, N. Y., for an Improved Washing Machine:

We claim the force pump, B, one or more, in combination with the clothes-press formed of the box, F, and follower, H; the pumps and clothes-press being placed within a case or box, A, and all arranged to operate substantially as and for the purpose set forth.

We further claim the ledges, d f, respectively on the bottom, G, and follower, H, of the press, when used in connection with the pumps, B, for the purpose specified.

[This invention consists in the use of one or more pumps placed in a pressing box or case, and in connection with a press to receive the clothes; the press being placed in the same box or case with the pump or pumps, and the pump cylinders connected with the press by a suitable pipe; all being so arranged that the clothes are cleansed by the forcing of water, or rather soap and water, through every part of their texture.]

27,837.—C. F. Edward Simon, of Washington town, N. J., for an Improvement in Restoring Waste Vulcanized Rubber:

I claim the mixing of the ground, or cut, or torn waste of vulcanized india-rubber with chloride of lime, in the manner described, and the exposing of the same to a heat of 900—1,200°, F. for the time and in the manner substantially pointed out.

27,838.—Henry Simon, of Providence, R. I., for a Shirt Stud:

I claim the combination of the movable hook-like shank, b, applied to slide in a slot in the back of the head, and the spring, c, applied to the said shank, to operate as described, in combination with the fixed hook-like shank, b.

[This invention consists in providing a stud or button with a hook-like shank fitted to slide in a slit in the back of the head, under the control of a spring within the head, whereby it is made to operate in combination with a fixed shank of similar form to secure the stud or button in the holes provided for it in the garment, and fasten the garment very securely; and whereby, also, provision is afforded for the insertion of the stud or button into and its withdrawal from the holes very easily.]

27,839.—Robert A. Smith, of New York City, for a Machine for Sweeping Streets:

I claim, first, Hanging the main broomshaft, G, in swinging arms, H H, from the axle, C3, so that said shaft will have a direct motion from the driving wheel, C2, substantially as set forth.

Second, In combination with the main broomshaft, hung as set forth, I claim the rods, c, arms, a a′, shaft, b, and rod, I, connecting with the lever, I′, for the purpose of enabling the driver to raise or depress this broomshaft at pleasure, as set forth.

Third, I claim giving to the main broomshaft, G, a yielding action, so that it will adapt itself to the inequalities of the street surface, whether effected by the arrangement of arms and connecting rods and springs, c e, as described, or in any other way substantially as described.

Fourth, I claim the universal coupling of the main broomshaft with the adjustable hanger, 8, for the purposes substantially as set forth.

Fifth, I claim the adjustable hangers, 1 1, with the chain pulleys, 5 5, and secondary broomshaft, when the same are arranged in relation to the pan, N, or its equivalent, as described and represented, for the purpose of adjusting the brush-shaft and keeping the brush in contact with this pan, at the same time to tighten up the chain as it wears loose on the pulleys.

Sixth, I claim the adjustable swinging trap or box, L, suspended over the main brooms and in rear of the same, for the purposes and substantially as described and represented.

Seventh, I claim arranging in front of the secondary broom cylinder, and in a suitable relation with the conducting pan, N, a dirt-receiver, R, supplied by any suitable mechanism, by which the box may be emptied of its contents at suitable intervals.

Eighth, I claim the guard board, T, placed between the front and rear brooms, for the purposes and as described and represented.

27,840.—E. S. Snell, of North Bridgewater, Mass., for an Improvement in Edge-planes for Boots and Shoes:

I claim the detachable blade, C, with a curved molded face, e, when the same is made adjustable on the curved top of the shank, B, substantially as described.

27,841.—N. T. Spear, of New York City, for an Improvement in Corn-huskers:

I claim providing the lower extremity of the hinged yielding apron, G, with one or more rollers, N, arranged as described, and operating in combination with the husking cylinders, C and E, in the manner and for the purpose specified.

27,842.—D. S. Stombs, of Newport, Ky., and Julius Brace, of Point Creek, Va., for an Improvement in the Distillation of Coal Oil:

We claim the herein-described process of re-distilling crude oil or other oils, by means of an apparatus constructed on the principle substatially as specified.

27,843.—Geo. A. Stone, of Roxbury, Mass., and Jas. A. Whipple, of Boston, Mass., for an Improved Steam Boiler:

We claim, first, The combination of tubes sloping upward, and arranged in rows relatively to each other substantially as specified, with water spaces connecting with these tubes and substantially surrounding a vertical tube box; the combination being substantially as described, for the purposes specified.

Second, We claim combining the shell of a boiler with the heating surface, d, or evaporating surface thereof, by means of a stuffing-box and a joint, substantially such as are specified, for the purposes set forth.

Third, We claim combining with the boiler shell an inside lining of wood, or other non-conducting material, arranged therein substantially in the manner and for the purposes described; and—

Lastly, We claim, in combination with a tube box, supporting tubes, arranged substantially in the manner described, and the steam space of a boiler, a foam plate, arranged substantially in the manner set forth for the purpose described.

27,844.—A. B. Stroup, of Waldron, Ind., for an Improved Bedcord-tightener:

I claim the combination and arrangement of the plates, A and B, tube, C, wheel, E, hooks, F, spring, H, substantially as and for the purpose specified.

27,845.—Myron E. Taft, of Potsdam, N. Y., for an Improvement in Cheese Presses:

I claim the combination, with the adjustable cross head and table, of the fixed and movable holding arms, J J, and horizontal pressing screws, G G, all arranged as and for the purpose set forth.

[This invention consists in making the cross head and the table of a press vertically adjustable, and in the employment of a jointed bar arranged along one side of the cross head, having curved arms, which, with similar arms on the opposite side of the head, and fixed to it, the chessel or cheese hoop may be secured in place on the table, and the machine may be adapted to receive various sizes of hoops. To this arrangement is attached a table with ledges along its sides for keeping the whey on the table.]

27,846.—Henry Underwood, of New York City, for an Improvement in Belting:

I claim the trapezoidal belt for machinery, as described and represented, forming a new article of manufacture.

27,847.—Charles L. Vasquez (assignor to R. H. Gratz), of Philadelphia, Pa., for an Improvement in Dry Gas Meters:

I claim forming between the level of the valve seat and the measuring compartments of a dry gas meter, a chamber, D, and an inlet pipe, G, communicating with the same; both pipe and chamber being arranged in respect to the plate, A, substantially as and for the purpose set forth.

27,848.—Wm. F. Warburton and C. E. Lovett, of Philadelphia, Pa., for an Improvement in the Manufacture of Hats:

I claim the process of attaching the lining to the interior of the hat by means of an elastic cement, simultaneously with the finishing of the exterior of the hat, as set forth.

27,849.—Burgan B. Wescott, of Camden, Ind., for an Improved Washing Machine:

I claim the arrangement of the tub, A, support, H, lever, F, standard, E, and rods, a a, with the rubber, D, and spring, C, when said spring is so secured between the lever and the rubber, that increased pressure will be added to the said rubber, as the rods, a a, assume a greater inclination, and when it assists in returning the rubber to its normal position, and elevating the levers substantially as specified.

27,850.—John L. Whetstone, of Cincinnati, Ohio, for an Improvement in the Running Gear of Locomotive Engines:

I claim the combination of the truck frame, E, with the springs, C2, of the front drivers, substantially as and for the purpose shown and described.

[This invention consists in supporting the weight of the front end of the engine partly upon a single axle and pair of truck wheels, and partly upon the forward pair of drivers, by means of a horizontally and vertically vibrating truck frame, the forward end of which rests upon the aforesaid pair of truck wheels and the end of which is connected, by suitable hangers, to the forward end of the springs of the forward drivers; the front end of the engine bearing upon the said vibrating truck at such point as shall cause the transmission of a desirable proportion of the weight to the axle of the truck wheels and forward drivers, respectively.]

27,851.—John Williams, of Kalamazoo, Mich., for an Improvement in Machines for Weighing Grain:

I claim, first, The revolving hopper, H, in combination with the bar, D, connected with beam weights, W, at the extremities of cords, k, and the attachment of said cords to the valves, substantially as specified, so as to regulate the cutting-off of grain by the weighing operation without making the proper action of the hopper dependent on the successful operation of the cut-off.

Second, The adjustable stop, f, in combination with the openings, e, in the rim, d, bar D, adjustable stop, t, scale beam and weight, arranged and operating substantially as and for the purposes set forth.

27,852.—Bennett F. Witt, of Dublin, Ind., for an Improvement in Harvesting Machines:

I claim the two-wheel binder's carriage, I I, constructed, arranged and connected in the manner described, with the reaping machine adapted for side delivery; the parts operating in combination substantially as and for the purposes specified.

27,853.—Calvin Woodward and Geo. M. Woodward, of New York City, for an Improvement in Feed-water Apparatus for Steam Boilers:

I claim the arrangement and combination of the three pistons, D E F, and rod, G, with the perforated cylinder, C, and jacket, B, as and for the purpose shown and described.

27,854.—Wm. E. Worthen, of New York City, for an Improved Lock:

I claim the combination of an oscillating or revolving tumbler, such as described, with a door, bolt and locking slide, substantially such as specified; the whole operating substantially as set forth.

And, in combination with a bolt and tumbler, substantially such as specified, I claim the notches, h h′, and a stud, g, or their equivalents, for limiting the range of motion of the tumbler.

27,855.—John Wyberd, of New York City, for an Improved Night-light Reflector:

I claim the dome-like arrangement of a system of corrugated reflectors, with alternate ventilating spaces, as set forth.

27,856.—Joseph Ziegler, of Baltimore, Md., for an Alarm Lock:

I claim controlling the opening of a drawer by means of a treadle operated by the foot, substantially in the manner described.

I also claim connecting or disconnecting, at will, the treadle which controls the drawer with an alarm bell, substantially in the manner and for the purpose set forth.

27,857.—Augustus C. Carey, of Lynn, assignor to himself and Joseph Storey, of Boston, Mass., for an Improvement in the Manufacture of Bank Notes:

I claim the improvement in the manufacture of bank notes, checks, bills of exchange, &c., which consists in uniting two or more layers or sheets of paper or other suitable material, upon or through one or more of which layers or sheets distinctive letters, figures or configurations have been previously formed, either by puncturing one or more, but never the whole, of the said layers or sheets; or by printing, coloring, or otherwise making distinctive marks upon either of the inner surfaces of the said layers or sheets.

27,858.—Edmund B. Cherevoy (assignor to himself and T. W. Weathered), of New York City, for an Improvement in Boilers for Hot-water Apparatuses:

I claim the radical water chambers, k k k, arranged within the conical water casing, as set forth, when connected to the said casing or dome by the screw thimbles, as specified.

27,859.—James Connell (assignor to himself, Christian Connell and Wm. Connell), of Port Huron, Mich., for an Improvement in Concentrated Extracts for Tanning Purposes:

I claim, as a new article of manufacture, a concentrated aqueous extract of the tanning and coloring principle contained in trees and shrubs, when prepared substantially in the manner described.

27,860.—James C. Cooke (assignor to the Russell Manufacturing Company), of Middletown, Conn., for an Improvement in Looms:

I claim the application of a friction clamp or apparatus to each or both rollers carried by the rocker levers, and operating the said levers by cams, substantially as described.

I also claim the combination and arrangement of one or more guide rollers or rods, a b, with the two rollers, L M, and their supporting levers; the same being to operate in manner as specified.

27,861.—J. T. Fuller (assignor to himself and Joseph Landes), of Louisville, Ky., for an Improvement in Casting Door Numbers:

I claim forming ribs or projections, a a, on the backs of letters, numerals, symbols, or ornamental designs of any description, in such a manner that they may be clamped and held by a bar or by bars, B B, in suitable combinations while an impression in sand or other material is taken, and then removed from the bar or bars, and others introduced at pleasure, substantially as and for the purposes described and represented.

[This invention consists in a novel arrangement of patterns for casting such signs as door numbers, signs of numbers for hotel doors, church pews or numerals, or letters and designs of any description, where they are grouped together and surrounded by a framework of any design, by which construction the letters may be changed and others substituted in the pattern of a different style or character; thus employing only one frame pattern for any letter or combination of letters. The mold is formed from the pattern thus prepared, and the casting taken in the usual manner.]

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27,862.—Charles A. Gale (assignor to himself and Spencer Russell), of Boston, Mass., for an Improved Automatic or Mosquito Fan:

I claim my improved arrangement of the fan or flag staff, the reversed cams, the cam shaft, and the clock-work mechanism for effecting the rotations of such cam shaft; the whole being made to operate substantially as described.

27,863.—Philetus W. Gates (assignor to himself, Thos. Chalmers and D. R. Fraser), of Chicago, Ill., for an Improvement in Crushing Rollers for Sugar Mills:

I claim making a portion of the surface of the rollers, A A′ B, concave circumferentially, substantially as and for the purposes set forth.

27,864.—Edward Lynch (assignor to himself and James I. McCool), of Buffalo, N. Y., for an Improved Churn:

I claim, first, The floating brake, H, constructed with a vertical ring, h′, and beveled radial arms, h2, operating in combination with vertical grooves, i, in the sides of the churn, in the manner and for the purposes explained.

Second, The combination of the tube, L, and faucet, M, constructed, arranged and operating substantially as and for the purposes set forth.

27,865.—Thos. Lindsey (assignor to himself and J. H. Beidler), of Lincoln, Ill., for an Improvement in Seeding Machines:

I claim the arrangement of the notched slide, C, wheels, h, oblique partitions, l, seed cells, k, tubes, q, p, and shares, D, as and for the purpose shown and described.

[This invention relates to certain improvements in that class of seeding machines which are designed for sowing seed broadcast, and at the same time plowing the ground to receive the seed. The object of the invention is to prevent the cutting and bruising of the seed by the distributing device, and also to gage the quantity to be sown on a given area of ground.]

27,866.—John McMurtry, of Fayette county, Ky., assignor to Farmer Dewees, of Lexington, Ky., for an Improved Mode of Securing Metal Hoops on Cotton Bales:

I claim the bending of the ends of metal hoops or bales, substantially as described above, for the purpose of making the fastening of the ends of the same, as shown in the accompanying drawings, for the purposes set forth.

27,867.—Warren Millar (assignor to himself and John Nutt), of Chicago, Ill., for an Improvement in Sewing Machines:

I claim the bobbin case, N, made up of the two curved disks, b b′, the one disk, b, having a hollow female screw, d, an eye or pulley, e, and a hole, f, and the other disk, b′, having a hollow male screw, g, which allows of the passage of the thread, and in connection with the screw, d, secures the disks to each other, as set forth.

And in combination with the bobbin case, N, constructed as described, and a needle of a sewing machine, I claim the oscillating curved barbed looper, P, having a groove, i, at the base of its barb for the thread of the loop, and its point prolonged, as set forth.

27,868.—F. D. Newbury (assignor to R. V. DeWitt, Jr.), of Albany, N. Y., for an Improvement in Revolving Fire-arms:

I claim the apparatus for enabling the hammer and trigger to be operated in concert with each other, whether the hammer be set by hand or by the trigger, viz.: 1. The bar, f, attached to the hammer, and working along the side of the trigger, in order to catch into the pin, p, in combination with the balance catch lever, g, operating as described. 2. Also, the pin, d, in bar, f, operating through the slot, t, and in combination with it and spring, u, or the mechanical equivalents for said apparatus, the whole operating together in manner and for the purposes set forth.

I also claim the combined action of the trigger and pin, k, with lever, V, in operating the cylinder, so that when the lever has turned the cylinder to bring a chamber in it and the barrel to coincide, the toe or front point, a, of the trigger, shall, jointly with the pin, k, and lever, V, hold the cylinder during the discharge of the piece, in the manner shown and described.

27,869.—Samuel Ray and M. P. Shalters, of Alliance, Ohio, for an Improvement in Mowing Machines:

We claim, first, The arrangement of the hinged bent lever, M, segment rack, N, sector, O, curved rack, Q, crank, P, perforated pendants, or guides, g g, brace, i, and finger-bar, S, the several parts constructed and combined in the manner and for the purposes described.

Second, The arrangement of the plate, R, with the pendants or guides, g g, provided with notches, g′, finger-bar, S, and lever, M, so as to admit of the turning back of the finger bar and sickle parallel with the frame, A, by raising the finger-bar and sickle, and at the same time admit of the finger bar and sickle being retained rigidly at right angles with the line of draft, when the machine is at work, substantially as set forth.

Third, The arrangement of the spring, t′, with the yielding movable bar, X, furnished with a pin, t, in combination with the hollow perforated socket, V s, and stationary bar, W, in the manner described, so that the track-clearer is capable of vibrating or yielding, and also may be easily adjusted without stopping the team, as set forth.

[The object of this invention is to obtain a simple and efficient machine for cutting grass, the sickle of which may be readily adjusted for cutting higher or lower, and also for passing over obstructions, and at the same time be well braced. The invention also has for its object a thorough cleaning of the grass at the outer end of the sickle, so as to form a clear or unobstructed track for the horses, and to protect the gearing and working parts from the cut grass. The invention has further for its object the protection of the bed or inner end of the sickle from the cut grass, so as to present the clogging of the same, and also an adjustment of the draught-pole to regulate side draught, and a peculiar arrangement of the gearing, whereby the pitman and sickle are operated without any undue friction, and without being subjected to any unnecessary strain.]

27,870.—H. C. Smith (assignor to Anson Smith), of Cleveland, Ohio, for an Improved Washing Machine:

I claim so arranging the tub that it may be actuated by means applied to its side, as set forth, in connection with a rubber that may be adjusted vertically, and so connected to the frame of the machine as to allow of its being turned out from the tub as described.

27,871.—Wm. H. Tendler (assignor to himself and J. F. Moeschlin), of Cambridge, Mass., for an Improved Sofa Bedstead:

I claim constructing the bed foundation, C, in two parts, e f, and applying the part, e, to the seat, B, and the rear half, f, to the front half, e, so as to operate therewith and with respect to the sofa frame, as described.

I also claim arranging and combining a bed clothes space or receptacle, l, with the seat, B, and the bed foundation, C, constructed and applied to the seat and the sofa frame, so as to operate as described.

27,872.—Freeman Walcott, of Milford, Mass., assignor to himself and F. A. Coffin, of Newburyport, Mass., for an Improvement in Board Roofing:

I claim a roof covering formed of a double series of boards grooved over their entire surface, as set forth, for the purpose specified.

27,873.—G. H. Warner (assignor to the Brooklyn Flint Glass Company), of Brooklyn, N. Y., for an Improvement in Glass Molds:

I claim the mechanism for molding glass for vault lights and other purposes, by which it is subjected to two consecutive pressures, one being applied for forcing or injecting and pressing the melted glass properly into the mold, or molds, and the other being applied during the cooling operation of the glass in the molds, substantially as and for the purpose set forth.

I also claim the employment or use of a forcing or induction plunger, H or H′, in connection with pressure plungers, D D′, and molds, a a′, arranged to operate substantially as and for the purpose specified.

27,874.—G. P. Foster, of Providence, R. I., for an Improvement in Breech-loading Fire-arms:

I claim the arrangement of the latch, F, and its catch, G, relatively to the trigger, and the guard lever, D, of the movable breech part, as described.

27,875.—Wm. W. Huse, of Brooklyn, N. Y., for an Improved Steering Apparatus:

I claim, first, The employment of one or more columns of water, or other liquid, for the purpose of transmitting the motion of the steering wheel to the rudder, substantially in the manner described.

Second, The arrangement of the cylinder, E, and barrels, F F′, in combination with the tiller, g g′, and wheel, C, constructed and operating substantially in the manner and for the purpose specified.

27,876.—Wm. C. Arthur, of Baltimore, Md. for an Improvement in Oil Cans:

I claim the combination of the spring, A, with the valve in the spout, arranged as above described.

RE-ISSUES.

J. C. Smith, of Philadelphia, Pa., formerly of Covington, Ky., for a Mode of Constructing Matrices, &c. Patented Sept. 20, 1859:

I claim, first, To render the alloy of copper and tin (when even mixed w th other metals or ingredients) pliable, soft, and in such a state as to admit of an easy and perfect impression of any proper design, figure, mold or object of or on metal; this figure, design or mold may be engraved or be produced by the art of electrotyping as a copy of any design or figure, thus yielding and producing a perfect mold, matrix or die.

Second, I claim the discovery that the alloy of copper and tin possesses the property to be pliable, soft almost like wax when under a red heat, and enabling us to press it in to any proper mold, and that this alloy will receive a perfect and sharp impression of such mold, article or design while under a red heat, without applying a great power in pressing.

Third, I claim, in connection, to manufacture printing type out of the alloy of copper and tin (when even mixed with other metal or ingredients) by rendering the alloy so pliable and soft by fire that it may be forced into any type mold by applying pressure, receiving a perfect impression of such mold, and in the mode already described.

Charles Eddy and Jacob Shavor, of Troy, N. Y., assignees, through mesne-assignments, of Henry Stanley, of Poultney, Vt., for an Improvement in Coal Stoves. Patented Jan. 4, 1845. Extended and Re-issued April 10, 1860:

We claim, first, The combination of the grate, i, with the chamber, E, substantially as and for the purposes set forth.

Second, The upper section and flues with the chamber, E, or its equivalent, as and for the purposes specified.

Third, The combination of the shell or projection, x, and the opening, S, to diffuse and heat the air before it enters the combustion chamber.

ADDITIONAL IMPROVEMENT.

John Gore, of Brattleboro, Vt., for an Improvement in Cutters for Harvesters. Patented Feb. 16, 1858:

I claim the combination of the removable cutters, b′, with bar, d, and intermediate teeth, d′, the two latter formed of the same piece; all the parts being arranged and connected together in the manner and for the purpose set forth.

EXTENSION.

Washburn Race, of Seneca Falls, N. Y., for an Improvement in Registers for Stoves. Patented April 4, 1846:

I claim the manner in which I combine the expansion rod with the register or valve, c, by means of the lever, k; the whole constructed and operating in the manner and for the purpose set forth, or in any manner substantially the same, by which the ordinary connecting joints are avoided.

DESIGNS.

John Martino and James Horton (assignors to Stewart & Peterson), of Philadelphia, Pa., for a Design for a Cooking Range.

John Polhamus, of New York City, for a Design for Spoon Handles.

Notes & Queries.

T. M. L., of Ga.—"Wells' Chemistry" will probably suit you. You can spend any amount of money you choose in chemical apparatus, from $1 to $100,000.

W. A., of Ill.—A horse weighing 1,100 lbs., traveling up an inclined plane of 45° inclination, at the rate of 220 feet per minute, raises his own weight 155 6-10 feet in this time, which is equal to 171,160 lbs., raised one foot per minute. This is about 5 1-5 horse-power.

D. B., of N. J.—If you have secured a patent for an invention, and another person has made an improvement upon it, he could not apply for the patent as an "additional improvement" by paying $15. He must needs take out a new patent, and pay the full fee of $30. The original patentee can only apply for the additional patent.

J. H., of Maine.—There is no known substitute for indigo in dying dark and "fast" blues on cotton. You can dye a cheap and dark blue with logwood and the bichromate of potash; but it is not fast, like the indigo.

J. T., of Ill.—So far as we know, sugar cane cannot be pressed perfectly dry with the most powerful crushing rolls yet applied to it; and, as a consequence, some of the saccharine sap is always left in the bagasse. There is nothing in cane, similar to wood, in regard to elasticity of its fiber.

J. H. B., of Ohio.—It is true that in the crank motion the power obtained in moving the crank a foot when it is near the dead point is less than is obtained by an equal movement when it is near the right angle. But the steam used in the former case is also less than in the latter; in both cases, the effect obtained, or the force exerted upon the resistance, bears the same proportion to the amount of steam employed.

I. T., of Md.—If you study out the entire principle and operation of the crank, you will be convinced that the treatise of the professor to whom you refer, who has "proved" that power is lost beside that of friction, is either a "dead point" or a "handfull of moonshine."

F. I. H., of D. C.—We published descriptions of Mr. Frost's experiments with steam in former volumes of the SCIENTIFIC AMERICAN. (See page 67, Vol. V., old series.) Mr. Frost was not correct in theory, but perfectly so in the practice of his discovery, as applied to steam engines. Others are reaping the benefits of his inventions.

G. B. D., of Ohio.—The cylinder of wood which you desire to fit water-tight into an opening that is rather large for it should be covered accurately with sheet lead until it fits the orifice snugly. We have seen very good steam joints made with sheet lead, without the use of a drop of solder, by scraping the surfaces that were to match, then squeezing them close together

H. M., of La.—The fact that Whitney invented the cotton gin in the winter of 1793-4 is so well-known and thoroughly proved that any man who asserts that it was borrowed from somebody else in 1801, does but proclaim his own ignorance.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, April 14, 1860:—

H. & W., of Ohio, $40; B. & McC., of Ill., $25; A. M. S., of Mass., $25; M. Q., of N. Y., $30; T. C. S., of N. J., $30; T. S. M., of Ohio, $30; D. H., of Ill., $30; W. D., of N. Y., $45; S. B., of Ga., $40; W. G. S., of Ill., $30; H. J. C., of Mass., $10; M. J. F., of N. Y., $275; H. L. N., of N. Y., $30; U. B. V., of Pa., $30; C. R. of Mich., $30; J. S., of N. Y., $30; G. & B., of Ind., $30; C. F. M., of Maine, $20; A. S. & D. M., of Ill., $25; E. C., of La., $30; W. A. H., of R. I., $25; C. M., of N. J., $25; L. B. H., of N. Y., $25; L. S., of Ala., $30; B. H., of Conn., $28; M. M., of Mo., $25; F. S., of Ill., $30; J. T. S., of Va., $30; S. & R., of Mo., $30; J. H. P., of R. I., $30; A. C. & Co., of N. Y., $150; I. R. S., of Va., $25; A. H., of Ohio, $25; P. & B., of Ohio, $30; L. K., of Conn., $30; N. & S., of N. Y., $125; A. H. R., of Pa., $35; T. B., of Ill., $30; C. R. A., of Conn., $209; A. H., of Iowa, $55; J. W., of Maine, $30; D. F. S., of Mass., $30; S. J., of Fla., $25; S. J. H., of Ill., $58; L. E. H., of Ill., $30; T. W., of Iowa, $10; A. C. K., of N. Y., $25; C. T. B., of N. Y., $25; G. F. F., of N. Y., $58; S. W. B., of N. Y., $56; J. P., of N. J.. $25; O. J. P., of Pa., $30; W. Y., of Ind., $20; D. G. G., of N. Y., $30; H. & L., of N. Y., $30; G. E. H., of N. Y., $25; J. M. B., of Iowa, $25; A. T., of Mass., $55; J. & D., of Ala., $30; H. & H., of N. C., $30; D. & G., of N. Y., $20; E. H., of Ala., $10; L. D., of Conn., $30; G. E. F., of N. Y., $30; A. J. G., of Mass., $30; G. S. G., of Del., $30; W. & K., of Ohio, $30; E. T. W., of Ind., $30; S. F. J., of Ind., $25; J. C., Jr., of N. Y., $10 J. S., of N. Y., $25; L. A. C. of N. Y., $25; J. S. S. of N. Y., $30; J. B., of N. Y., $55; Baron O. DeG., of Me., $100; W. C., of Ill., $25; J. W. S., of N. Y., $25; E. C., of N. Y., $25; J. F. K., of N. Y., $30; U. B. P., of N. J., $12; S. & P., of Mich., $30; J. C., of N. Y., $10; W. B. G., of Pa., $25; H. N., of Pa., $30; G. A. L., of Ill., $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, April 14, 1860:—

W. J. McL., of N. Y.; M. M., of Ill.; J. P., of N. J.; G. E. H., of N. Y.; J. M. B., of Iowa; B. H., of Conn.; D. H., of Ill.; A. H. R., of Pa.; S. J., of Fla.; J. M. F., of Va.; J. S., of N. Y.; L. S., of Ala.; M. M., of Mo.; B. & McC., of Iowa; L. B. H., of N. Y.; N. H. G., of Conn.; I. R. S., of Va.; W. D., of N. Y.; T. G. A., of N. Y.; E. T. W., of Ind.; W. A. H., of R. I.; A. S. & D. M., of Ill.; C. M., of N. J.; A. M. S., of Mass.; A. C. K., of N. Y.; E. H., of Cal.; M. W., of N. Y.; A. H., of Ohio; J. J. U., of La.; C. R. A. of Conn. (3 cases); S. F. J., of Ind.; C. T. B., of N. Y.; G. F. F., of N. Y.; C. W. B., of Mass.; S. & P., of Mich.; W. C., of Iowa; W. B. G., of Pa.; J. W. S., of N. Y.; E. C., of N. Y.; J. W., of Iowa.

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IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. JUDGE MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of fourteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

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The annexed letters from the last three Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

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CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs. MUNN & Co.—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

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MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

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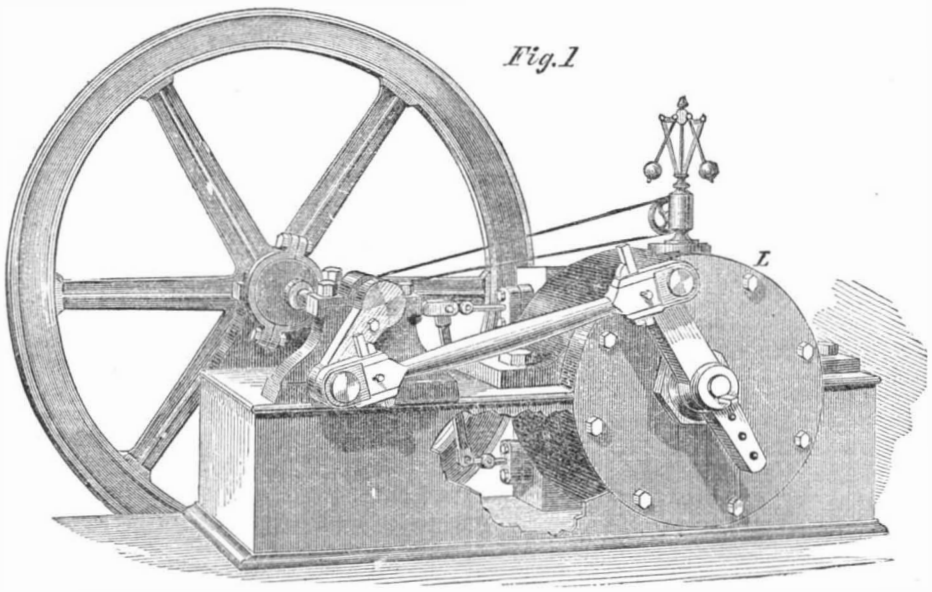
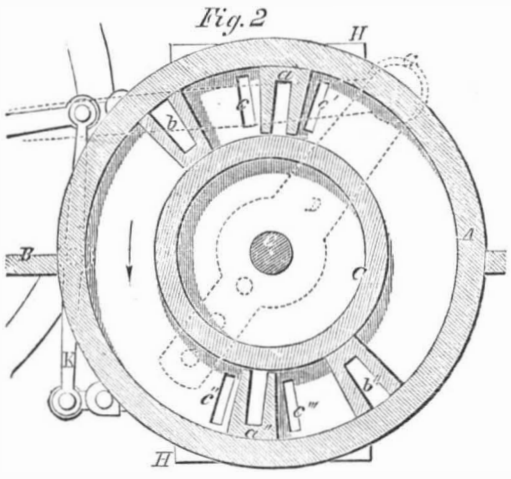
RUNKEL'S OSCILLATING PISTON ENGINE.

On the first page of this volume of the SCIENTIFIC AMERICAN, we gave an engraving of Runkel's engine with the piston oscillating, and the invention which we here illustrate is an improvement on that engine, which has been subsequently patented.

Fig. 1 is a perspective view, and Fig. 2 a vertical section. The engine consists of a short cylinder, L (Fig. 1); the central portion of which is occupied by a wheel performing the office of a piston, which makes about half a revolution in one direction, and then stops and turns back in the other direction; thus oscillating back and forth. In Fig. 2, the wheel, C, is shown with the two wings, *b* and *b''*, fastened securely upon it, extending to the inner surface of the cylinder, and packed steam-tight on their sides and ends. Two abutments, *a* and *a''*, are secured rigidly to the cylinder, and project inward to the wheel or piston, C; being packed at their ends so that the piston may revolve against them steam-tight. Steam is admitted and discharged through the ports, *c c' c'' c'''*, which communicate with an ordinary steam chest, H, and are opened and closed by the common D valve, or any valve of suitable form. When steam is admitted through the port, *c*, the port, *c''*, is opened to the exhaust; and thus the steam pressing upon one side of the wing, *b*, forces the piston round in the direction indicated by the arrow. At the same time, steam is admitted through the port, *c'''*, and exhausted through the port, *c'*; thus forcing the piston in the same direction by action on the opposite side. When the two wings have been carried nearly against the abutments, the valves are changed so as to admit the steam through the ports from which it had previously been discharged, and the motion of the piston is reversed.



RUNKEL'S IMPROVED OSCILLATING PISTON ENGINE.



The crank or arm on the end of the axle is made of a proper length, in relation to the length of the crank on the fly-wheel shaft, to cause a revolution of the latter at each oscillation of the former.

It will be seen that the pressure on the axle of the piston is balanced, as it acts on both sides; thus reducing the friction to the lowest point, and obviating all tendency of the piston to get out of place by wearing its bearings.

This is a simple and compact engine; and, from the nature of its motion, and consequent modification of its connections, it is better adapted to many situations than the straight cylinder engine. The inventor says that it can be made very much cheaper than any other engine of the same power. Charles H. Haswell, formerly Engineer-in-Chief of the United States Navy, examined this engine before the improvement was made in it, and gave the following opinion in relation to it:—

No. 6 Bowling-green,
New York, Jan. 24, 1860.

SIR:—In compliance with your request, I have visited and examined the steam engine designed by Mark Runkel. The engine, in design, is that of a semi-cylindrical, with an oscillating piston, connected with the driving shaft simply by a vibrating arm and connecting rod. The essential novelty of this essay is that of restricting the operation of the piston to the outline of a sector of a circular ring, whereby the unequal wear of the packing of the piston, from the unequal velocity of it at its periphery and axis, is very effectually removed. In application, this engine is peculiarly adapted for driving the propellers of marine steamers, from its possessing less momenta in its working parts, its dispensing with slides, and rendering high velocities of piston more practicable of attainment than in any other design of engine yet essayed.

CHAS. H. HASWELL.

Mr. Haswell has since examined the engine with this improvement in operation, and makes the following statement in reference to it:—

NEW YORK, April 9, 1860.

SIR:—In compliance with your further request, I have examined another of the steam engines before described, of the design of Mr. Mark Runkel; this one being improved in having two pistons attached to each other, and vibrating through opposite arcs in a divided cylinder. In this arrangement is attained the advantage of the stress upon the piston shaft bearings being relieved by the pressure of one piston counterbalancing that of the other.

CHAS. H. HASWELL.

The patent for this improvement was obtained (through the Scientific American Patent Agency) on March 6, 1860, the original patent having been issued on April 12, 1859; and persons desiring further information in relation to it may address the inventor, Mark Runkel, at No. 172 Center-street, this city, where an engine may be seen in operation. Patents have been secured in Europe on this invention, through this office.

PYROPHORUS.—We are able to accomplish many things, now-a-days, which have a parallel only in the enchantments of the genii of the "Arabian Nights;" and, indeed, to the unlearned eye, some laboratory experiments appear something more than marvelous. A very remarkable class of bodies made by the laboratorians are the pyrophori, or fire-bearers. There is a liquid called "Alcarsin," which, when poured from a vial into the air, spontaneously takes fire, burns with a white flame, and evolves a most intense odor. Those who witness this singular experiment are as amazed as Aladdin, when the African magician said, "You see what I have done by virtue of my incense!" Alcarsin, cacodyl and other liquids can, however, only be made by experienced chemists; but what is known as the alum pyrophorus and the lead pyrophorus are easy of preparation, and fit experiments for philo-chemists who are climbing the ladder of learning, as we shall now illustrate. Dissolve 1¼ ounces of acetate of lead in a glass of water; also, dissolve ½ ounce of tartaric acid in water, as you would do in mixing a seidlitz powder; then mix the solution. A white, cloudy precipitate falls, called "tartrate of lead;" collect this on a filter, and dry it for use. Fill any small vial one-third full with dry tartrate of lead, stand it upright in a small crucible, then fill up the crucible with sand, and the vial will remain in position. When this is done, stand the crucible in a little nook of a small and clear fire. In due time, it will become red-hot; empyreumatic vapor will rise from the bottle, which will burn with a pretty blue flame. When there is no more vapor, remove the crucible, and put a piece of chalk over the mouth of the bottle till it is cold enough to handle; then insert a good cork to keep out air. The contents of your vial is now pyrophorus; and if poured out into the air, it will take fire. Another pyrophorus may be made in a similar way, with 3 ounces of alum and 1 ounce of sugar, dissolved and evaporated to dryness. Both these pyrophori are in the form of a dry black powder, and maintain their quality for a lengthened period, if kept from the air. Thus, the followers of St. Januarius may perform a miracle to mystify his votaries.—*Septimus Piesse.*

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T. J. COGHLAN.

Sumter, S. C., April 11, 1860.

WATER WHEEL EXPERIMENTS AT PHILADELPHIA.—From all portions of the manufacturing districts we continue to hear of the universal interest which is felt in these valuable experiments. One of our most extensive cotton manufacturers, calling on us a few days ago to see if he could learn anything reliable in regard to them, remarked that he was only waiting the result to order three or four new turbine wheels for his works. Our readers may be sure that just as soon as the experiments are closed, we shall publish a full account of them without any delay.

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MUNN & CO.
Publishers, No. 37 Park-row, New York.

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